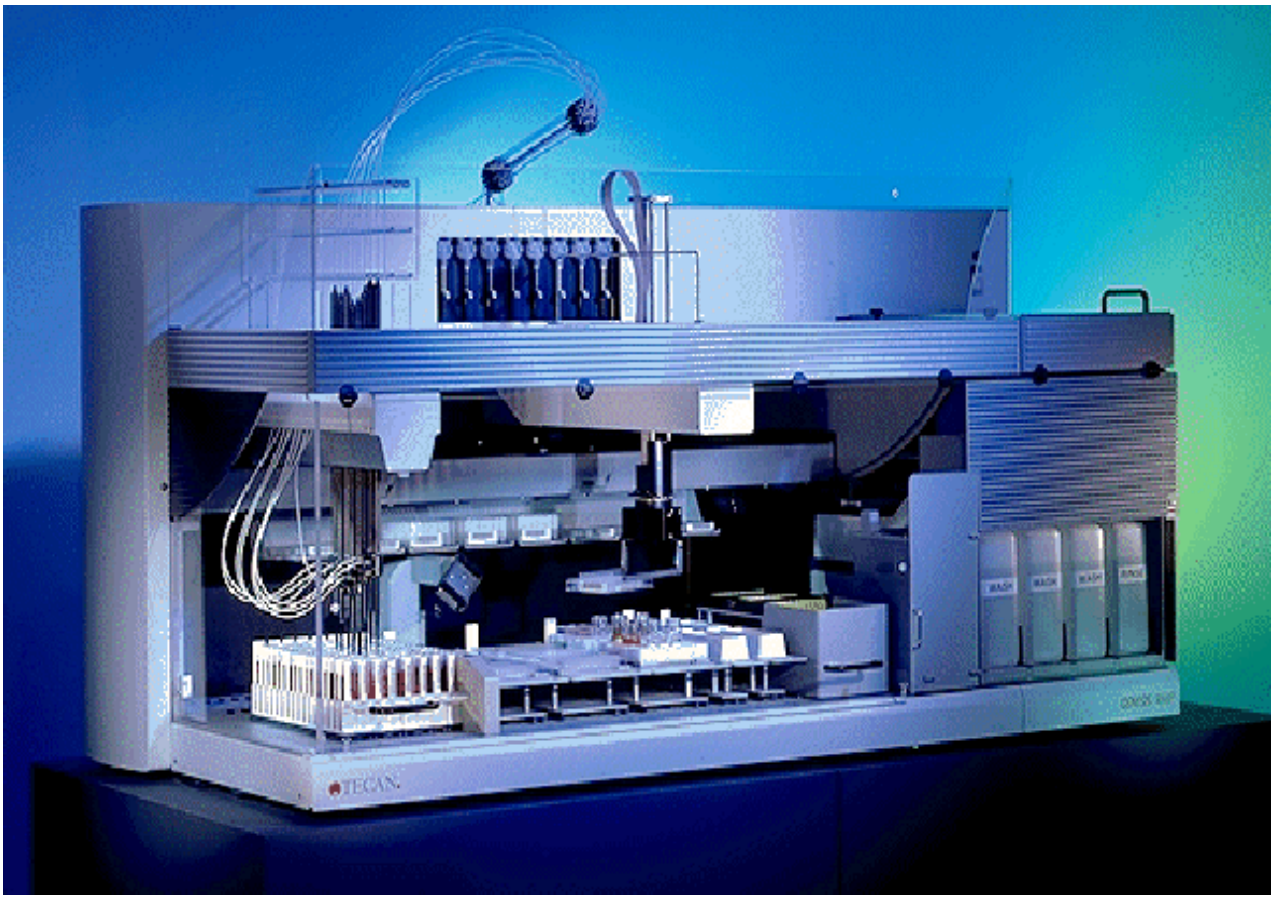
TECAN.

GENESIS RMP Operating Manual



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Preface

General

This manual provides basic information about the use, operation and maintenance of the instrument for the user.

Before operating the instrument, the user must read and understand this manual.

TECAN Schweiz AG regularly offers Operator Training Courses. We highly recommend to attend such a course prior to working with the TECAN Instrument.

Information provided by TECAN is believed to be accurate and reliable. However, the user is responsible for the proper and correct use of the instrument. No license is granted by acquisition of the instrument for any patent or patent rights of TECAN.

If the user does not follow the instructions given in this manual, TECAN does not take any responsibility for injuries or damages caused by the TECAN Instrument.

Purpose of this document

This Manual is intended to instruct the operator how to operate the instrument and do repairs and maintenance on an operating level.

Operating Documentation

GENESIS RMP Operating Manual P/N 390 840

GENESIS RMP TOPS Software Manual P/N 390 837

GENESIS Maintenance and Service Logbook 390 924

Installation and Servicing

Installation, servicing and reinstallation of the instrument shall only be performed by TECAN authorized service personnel.

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1 Product Description 1 - 1

1.1 Introduction . . . 1 - 1
1.1.1 GENESIS RMP Overview . . . 1 - 1
1.1.2 Reference Documentation . . . 1 - 2
1.1.3 Intended Use . . . 1 - 2
1.1.4 Precaution . . . 1 - 2
1.1.5 EU-Conformity . . . 1 - 2
1.1.6 Product Identification . . . 1 - 2
1.2 Minimal Computer Requirements . . . 1 - 3
1.3 Instrument specifications . . . 1 - 3
1.3.1 GENESIS RMP Overall Dimensions . . . 1 - 3
1.3.2 Worktable Dimensions . . . 1 - 4
1.3.3 Weight . . . 1 - 4
1.3.4 Supply Connections . . . 1 - 4
1.3.5 Environmental Conditions . . . 1 - 5
1.3.6 Emissions . . . 1 - 5
1.3.7 Modules . . . 1 - 5
Liquid System . . . 1 - 5
Diluter . . . 1 - 6
Incubator . . . 1 - 6
PosID . . . 1 - 6
Reader . . . 1 - 6
Washer . . . 1 - 6
1.4 Equipment . . . 1 - 7
1.4.1 Standard Delivery . . . 1 - 7
1.4.2 Accessories and Spare Parts . . . 1 - 7

2 Safety Instructions 2 - 1

2.1 Introduction . . . 2 - 1
2.1.1 Definition . . . 2 - 1
2.1.2 Target Group . . . 2 - 1
2.1.3 Importance of the Safety Instructions . . . 2 - 1
2.2 Warnings, Cautions and Notes . . . 2 - 2
2.2.1 Barcode Scanner (PosID Option) . . . 2 - 2
2.2.2 Use of Mobile Phones . . . 2 - 2

3 Structure and Function 3 - 1

3.1 Introduction . . . . . 3 - 1
3.2 Liquid System. . . . . 3 - 1
3.2.1 Principle of Functioning . . . . . 3 - 1
3.2.2 System Liquid. . . . . 3 - 2
3.2.3 Liquid Level Monitoring . . . . . 3 - 2
3.2.4 Liquid Detection . . . . . 3 - 2
3.2.5 Wash / Waste Station. . . . . 3 - 3
3.3 Hardware System Modules . . . . . 3 - 3
3.3.1 Liquid Handling Arm, LiHa . . . . . 3 - 3
3.3.2 Robotic Manipulator Arm, RoMa . . . . . 3 - 4
3.3.3 Positive Identification, PosID . . . . . 3 - 5
3.3.4 Colombus Microplate Washer . . . . . 3 - 5
3.3.5 Sunrise (Spectra) Microplate Reader. . . . . 3 - 5
3.3.6 Room Temperature Incubator . . . . . 3 - 6
3.3.7 Shaker / Heated Incubator . . . . . 3 - 6

4 Operating Keys, Display, Operating Modes 4 - 1

4.1 Introduction . . . . . 4 - 1
4.2 Warning Signals. . . . . 4 - 1
4.3 Operating Keys . . . . . 4 - 1
4.4 Display . . . . . 4 - 2
4.5 Malfunction Indicators . . . . . 4 - 2
4.6 Operation Modes . . . . . 4 - 3
4.6.1 Introduction . . . . . 4 - 3
4.6.2 No Worklist. . . . . 4 - 3
4.6.3 Worklist . . . . . 4 - 3
4.6.4 Worklist Query Mode with Worklist Editor . . . . . 4 - 3

5 Installation 5 - 1

6 Operation 6 - 1

6.1 Introduction . . . 6 - 1
6.1.1 Safety Instructions . . . 6 - 1
6.1.2 Operator Qualification . . . 6 - 1
6.2 Operation . . . 6 - 2
6.2.1 Instrument Setup . . . 6 - 2
Placing Barcode Labels on Carriers, Racks and Containers . . . 6 - 2
Placing Carriers, Racks and Containers onto the Worktable . . . 6 - 3
Preparing the Pipetting System . . . 6 - 3
6.2.2 Switching on the GENESIS RMP . . . 6 - 3
6.2.3 Setting up a Run . . . 6 - 4
Introduction . . . 6 - 4
Setting up a Run: No Worklist . . . 6 - 5
Setting up a Run: Worklist . . . 6 - 10
Setting up a Run: Worklist Query Mode with Worklist Editor . . . 6 - 14
Setting up a Run: Unidentified Barcodes . . . 6 - 18
Setting up a Run: Options . . . 6 - 18
6.2.4 Running a Profile . . . 6 - 19
Running a Profile: Introduction . . . 6 - 19
Running a Profile: Handling To Do Steps . . . 6 - 20
Running a Profile: Refilling DiTi's . . . 6 - 20
Running a Profile: Manually Pipetting of Common Pre-Dilution . . . 6 - 21
Running a Profile: Handling Errors . . . 6 - 21
6.2.5 End of Run . . . 6 - 22
End of Run: Introduction . . . 6 - 22
End of Run: Test Error Report . . . 6 - 22
End of Run: Pipetting Status Report . . . 6 - 23
End of Run: Test Result Files . . . 6 - 23
6.2.6 Creating Backup folders . . . 6 - 24
6.2.7 Switching off . . . 6 - 24
6.3 Malfunction - Troubleshooting . . . 6 - 25
6.3.1 Basic Instrument . . . 6 - 25
6.3.2 Liquid System . . . 6 - 26
6.3.3 RoMa . . . 6 - 27
6.3.4 PosID . . . 6 - 27
6.3.5 Heated / Shaking Incubator . . . 6 - 27
6.3.6 Room Temperature Incubator . . . 6 - 28
6.3.7 Washer . . . 6 - 28
6.3.8 Reader . . . 6 - 28

7 Maintenance 7 - 1

7.1 Introduction . . . 7 - 1
7.1.1 Safety Instructions . . . 7 - 1
7.1.2 Personnel Qualifications . . . 7 - 1
7.2 Schedule . . . 7 - 1
7.2.1 General Directions . . . 7 - 1
7.2.2 Daily Maintenance . . . 7 - 1
7.2.3 Routine Maintenance . . . 7 - 2
7.2.4 Half Yearly and Yearly Maintenance . . . 7 - 2
7.3 Procedures . . . 7 - 2
7.3.1 Liquid System . . . 7 - 2
Checking the Liquid System for Leaks . . . 7 - 2
Flushing the Liquid System . . . 7 - 3
Cleaning the Liquid System . . . 7 - 4
7.3.2 Syringes . . . 7 - 5
Tightening the Syringe and Plunger Lock Screws . . . 7 - 5
7.3.3 Washer . . . 7 - 5
Rinsing the Washer . . . 7 - 5
Unclogging Nozzles . . . 7 - 6
7.3.4 Liquid Containers . . . 7 - 6
Cleaning the Liquid Containers . . . 7 - 6
7.3.5 RoMa / LiHa . . . 7 - 7
Cleaning the Arm Guide . . . 7 - 7
7.3.6 Fixed Tips . . . 7 - 7
Cleaning the Fixed Tips . . . 7 - 7
Checking Fixed Tips for Damaging . . . 7 - 7
Replacing Fixed Tips . . . 7 - 8
Flushing new Tips with H2SO4 . . . 7 - 9
Disposable Tip (DiTi) Adapter . . . 7 - 9
Cleaning DiTi Cones . . . 7 - 9
Tightening DiTi Cones . . . 7 - 9

8 Repair 8 - 1

9 Instrument Shut down, Storage 9 - 1

9.1 Instrument shut down . . . 9 - 1
9.1.1 Reporting . . . 9 - 1
9.2 Storage . . . 9 - 2

10 Packing and Transportation 10 - 1

10.1 Unpacking . . . 10 - 1
10.2 Packing . . . 10 - 1
10.3 Transportation . . . 10 - 1

11 Disposal 11 - 1

12 Accessoires and Spare Parts 12 - 1

13 Customer Support 13 - 1

13.1 Customer Support on the Internet . . . . . 13 - 1
13.2 How to reach us by Telephone . . . . . 13 - 1

A Decontamination Form A - 1

B Pipetting Status B - 1

Glossary

Note: This glossary explains terms used in any of the GENESIS Series Manuals or Software packages. Terms explained here do not necessarily occur in the present Manual.

Accuracy

The degree of conformity of a measure to a standard or true value (difference of expected value and the actual value, divided by the expected value multiplied by 100%).

Action

Building blocks that can be used to define a *Test*. Each action is performed by one hardware or one software module.

Additive

A liquid (e.g. reagent, diluent) taken from a *Container* on the work table and added to several or all *Samples* / *Standards* / *Controls* / *Blanks* in order to cause or influence a reaction.

Additive Distribution

A *Distribution* which adds an *Additive* to *Destination* containers which have already received liquid during a previous *Distribution* or are going to receive liquid in a *Follow-Up Distribution*

Application

Generally refers to a software package with a specific purpose, for example, RIA, EIA, etc.

Aspirating Tubing

The tubing leading from the reservoir of *System Liquid* (diluent) to the diluter valve.

Blank

A position in a *Destination Rack* which does not receive *Sample* but only the *Additive*(s). It is used to determine the background signal in the detection or measurement system (e.g. a photometer).

CAN-Bus

A communication standard for data transmission between computer and computer equipment. For example, internal communication in the GENESIS RSP uses the CAN-Bus.

Carrier

One unit of a *Carrier Class* identified by its position on the worktable and /or its unique barcode.

Carrier Class

A set of properties (e.g. number of racks, X-, Y- and Z-offsets) of an arrangement of one or several *Rack classes* independent of their work table position.
See also: *Class*

Class

A GENESIS software concept describing either a *Container*, *Rack* or *Carrier* which may be placed on the *Worktable* as often as required.

Cleaner

The well in which a tip is positioned in order to wash both its interior and exterior surfaces, by dispensing *System Liquid* through the tip.

Clot Detector

A program function issuing a message if the difference between the liquid levels measured before and after sample aspiration does not correspond to the calculated difference of level, indicating clots attached to the tip.

The liquid detector works in both directions, i.e when moving into a liquid and when coming out. This "dip-out" or “bi-directional” feature allows to detect aspirated blood clots. The principle is simple. The software stores the position at which the “dip-in” signal occurred. The volume aspirated and the vial diameter is known. Therefore the software can calculate the point at which the “dip-out” signal should occur. If the “dip-out” signal occurs at a much higher position, it can be assumed that a clot is attached to the tip. A tolerance for cohesion effects must be taken into account.

Coefficient of Variation (CV%)

A statistical representation of the precision of a test.
The function: standard deviation / mean x 100%.

Command (String)

A combination of user entered parameters according to the rules of the “COMMAND SET”, which instructs the RSP to perform different actions.

Conditioning Volume

The volume of excess liquid which is aspirated together with the liquid to be distributed and immediately discarded (usually in the source container) before the dispense process starts. It serves to create a controlled state of the system.

Container

One copy of a *Container Class* (usually a tube, an MTP well, or a reagent bottle, etc.), identified by its position in a *Rack* and/or its unique ID. See also: *Class*

Container Class

A set of properties (e.g. diameter, height etc.) of a container for liquids (e.g. a well of an MTP, a tube or a bottle) independent of its position on the worktable.
See also: *Class*

Control

A liquid containing a known concentration of the substance which is to be tested. Used to determine (high / low / cutoff) limits and/or as reference for quality control. The properties of the control are well known and stable.

CU

Central Unit. The central electronics board of the RSP, seated behind the OPTIBOARD. The main microprocessor and EPROM are located on this board. The CU is the control center for the instrument and all of its optional devices.

Deep-Well Plate

A sort of microplate with a capacity of more than 400 µl of each *Well*. Mainly used for predilution and / or for storage of serum.

Device

An addressable component of the RSP or additional option which can communicate with the CU, e.g. arm, diluter, valve, PosID, etc.

Destination

The *Rack* holding the *Container*(s) into which liquid is dispensed.

Diluter

Precision pump to aspirate and dispense exactly defined volumes of liquid by means of motor driven syringes.

Distribution

One or a sequence of *Pipetting Cycles* defined together with the appropriate liquid handling parameters.

Drive

The component of the computer housing a disk (floppy or hard disk).

EPROM

Erasable, **P**rogrammable, **R**ead **O**nly **M**emory chip, containing firmware programs.

Error Handling Mode

One out of a variety of possible *system reactions* (e.g. stop instrument and call operator, or aspirate at Z-max, or skip sample, etc.), triggered by an error condition.

Excess Volume

The volume of excess liquid which is aspirated together (not separated by an airgap) with the liquid to be distributed. It is not dispensed anywhere, but discarded to waste (or a special position) after use, and serves to minimize dilution of the reagents by the system liquid.

Firmware

The term used to describe the software which is stored in a fixed form on the EPROM.

Flex Cable

A flat cable which is used as the medium for power / data transmission from a board to a moving part.

Flush

The procedure which rinses the total *Liquid System* with the purpose of removing air pockets or exchanging the *System Liquid*. It is executed only at the beginning or the end of a *Distribution*.

Follow-Up Distribution

A *Distribution*, which uses as source a position filled in a previous distribution.

Free Dispense

Dispensing without the tip touching the liquid.

(Function) Mode

One out of a variety of ways to execute a certain function (e.g. liquid detection mode: on or off).

Global Liquid

A liquid used for several tests. It is in a defined position on the worktable.

ILID

Integrated **Li**quid **D**etector. Electronic device mounted on the arm. The ILID monitors the capacitance between the pipetting tip and the electrical ground (worktable). It generates a signal when there is a sudden change in capacitance, caused by the pipetting tip coming in and out of contact with an ionic solution. This signal is used for liquid and clot detection.

Initialization

A term used to describe the calibration of one or more axes of the RSP. The axes are offset to a predefined position. When the instrument is fully initialized, the X / Y / Z-coordinates are 0, 0, Z-Max. The RSP operates using an absolute coordinate system which requires an X / Y / Z- calibration.

LED

The acronym LED stands for Light Emitting Diode. It is generally used to visually signal the status of an electronic board.

Liquid Detector

ILID

Liquid Class

A set of properties defining a theoretical model of one type of liquid. Identified by a generic name (e.g. 'Serum', 'Buffer', 'Ethanol' etc.), it includes all default *Liquid Handling Parameters* required to process liquids of this type.

Liquid Handling Arm

RSP component mounted to the X-slide containing and holding the pipetting tips.

Liquid Handling Parameters

The set of parameters which influence the liquid distribution process (e.g. aspirate and dispense speeds, delays, tracking etc.).

Liquid System

All instrument modules and parts which contain or directly influence liquid (tubing, diluters, valves, tips, etc.).

Local Liquid

A liquid used for one test only, and which is placed into a test-specific (transportable) reagent rack.

Microplate

A plate of standardized size, usually containing 96 containers (well).

Module (Software)

A unique application with its own icon in the program manager.

Multi pipetting

The *Pipetting Mode* where one aspiration is performed for aliquoting into several destination positions.

Offset

After the RSP detects the initialization signal in one of the three axes during the initialization cycle, it moves back a certain distance. This distance is the offset.

Partition Volume

The volume of liquid, between two airgaps, which separates the *System Liquid* from the liquid to be aspirated. It is wasted after use.

Periodic Tip Replacement

The disposable tip replacement procedure which is only executed after a certain, defined number of *Pipetting Cycles*. See also: *Standard Tip Replacement*.

Periodic Wash (Procedure)

A wash procedure which is only executed after a defined number of *Pipetting Cycles*.

Pipetting Cycle

A sequence of *Steps* which is repeated in identical or closely similar manner.

Pipetting Mode

Describes the main method by which a liquid can be distributed: either by *Single Pipetting* or *Multi pipetting*.

Plate Layout

Definition of the positions in a *Rack* into which *Samples* and *Additives* etc. are to be pipetted.

PosEval (Position Evaluation)

A software feature which permits the operator to control the X/Y/Z position of the arm via keyboard arrow (cursor) keys.

Position

The physical coordinates of the pipetting tip at a given location on the work table; it is expressed as X, Y and Z mm from the initialization position.

Precision

See *Coefficient of Variation (CV%)*.

Pre-Dilution

A technique in which a liquid (e.g. sample, control) is first diluted with *Additive* or *System Liquid*. Some of the resulting mixture is processed further in a *Follow-Up Distribution*. The remainder of the mixture is usually discarded.

Profile

A group of tests performed in one *Run*.

Rack

One unit of a specific *Rack* class on a *Carrier*, identified by its position, the process assigned to it, or its barcode. Racks can be of various types: rectangular, circular, etc. See also: *Class*

Rack class

A set of properties (e.g. number of rows, columns, offset etc.) of an arrangement of *Container Classes* (as e.g. an MTP rack), independent of its position on the worktable. See also: *Class*

Ramping

The acceleration and deceleration of motors to achieve smooth movement.

Rectangular Rack

A physical arrangement of *Containers* whose dimensions are uniform. Each row and column has the same number of containers and the distances between rows or columns are uniform.

Retract

The process of pulling a tip back up after aspiration or dispensing.

RoMa

Robotic **M**anipulator **A**rm. Component which grasps and moves objects within the working area of the instrument.

RS232

A communications standard for data transmissions between computer and computer equipment. For example the instrument and the computer are connected by RS232.

RS485

A communications standard for data transmission between computer equipment.

Run

A sequence of processes on the instrument, started by the user by selecting a method from a menu and ending with the return to this menu.

Sample

Specimen of the substance (e.g. blood, serum, urine etc.) to be analyzed by means of a *Test*.

Scheduler

A software part which optimizes and connects tests of a run in order to minimize the overall run time.

Serial Dilution

A fraction of the liquid dispensed into a *Destination* position is re-aspirated and then dispensed together with *Additive* or *System Liquid* into a further destination position. This process can be repeated. Usually, all destination positions filled in this manner are processed later on.

Setup

The implementation of the hardware on an instrument (e.g. tip type, number of diluters per channel, etc.) and the assignment of basic settings (e.g. permissible X-range of a specific instrument, size of installed syringes on a diluter, etc.). This is usually done during the installation of a new instrument.

Single Pipetting

The *Pipetting Mode* in which an individual aspiration is performed for every destination position. See also: *Multi pipetting*.

Source Rack

The *Rack* holding the *Container*(s) out of which liquid is aspirated.

Standard

A liquid containing a defined concentration of the substance to be tested. Is used to create a standard curve by which concentration of the analyte in the *Samples* can be determined. The properties of the standard are well known and stable.

Standard Wash (Procedure)

The wash procedure executed after every single *Pipetting Cycle*. See also *Periodic Wash (Procedure)*.

Step

A sub-procedure or an element of a *Distribution*.

Submerge

The distance the tip will travel downward after liquid is detected. This parameter is programmed by the operator to avoid aspirating bubbles or debris at the liquid surface.

System Liquid

A liquid which fills the *Liquid System* and is used as wash fluid and /or can be added to several or all *Samples* analogously to the *Additive*.

Test

A sequence of *Actions* that is performed automatically and gives a result that is automatically measured.

Testkit

An assembly of liquids and consumables necessary to make an assay.

Tip Touch Dispensing

Dispensing with tip touching the liquid in the destination container.

Tracking Speed

Refers to the speed at which the tip moves up or down to follow the liquid level during aspiration and dispense operations.

Volume Calibration Function

The software function by which the volumes actually pipetted can be calibrated in order to correspond exactly to the volume intended.

Wash

Means to aspirate system liquid from the diluent reservoir and dispense it through the system into the wash position, to clean the inside and the outside of the pipetting tip.

Wash Station

Generally referred to as the physical combination of a *Cleaner* position and a *Waste* position.

Wash to Waste

The procedure which removes remainders of liquid from within the tip and the *Liquid System* to prevent carryover. It is executed after each or a few *Pipetting Cycles* within a *Distribution* and the wash liquid is discarded into the *Waste* position.

Wash to Cleaner

The procedure which removes remainders of distributed liquid from the tip (inside and outside) and the liquid system to prevent carry-over. It is executed after each or a few pipetting cycles within a distribution and the liquid is discarded into the cleaner position.

Waste

The position in the wash /waste carrier into which a tip is placed for washing its interior. The system liquid is dispensed through the tip and then into the outer cavity of the wash /waste carrier. From there, waste liquid flows off through the waste tubing to the waste container.

Well

One of the containers in a *Microplate*.

Workarea

The instrument area which can be accessed by the pipetting tips and the *RoMa*.

Worktable

Part of the instrument where the carriers are placed for access by the *Liquid Handling Arm*.

Worklist

A list in which tests and other pertinent information (e.g. status of the individual distribution) are assigned to a number of individually identified *Samples*. Often downloaded by a host to the instrument PC, the worklist allows to run various tests on a given set of samples, so that every individual sample is subjected to only the required tests.

X/Y/Z-movement

The left-right (X), front-back (Y), and up-down (Z) motions of the pipetting tip.

Z-dispense

The height of the point of the tip at which liquid is dispensed.

Z-bottom

The lowest possible position the tip is allowed to reach. During a “search liquid command” the instrument will search for liquid from Z-start down to Z-bottom. If the tip reaches Z-bottom without finding liquid, the instrument reacts according to the liquid detection error mode selected.

Z-start

The height of the tip at which the ILID is switched on during a “search liquid command”. It is usually slightly above the rim of the liquid container.

Z-travel

The height at which the tip moves from one X/Y-position to another. Moves which cross different racks always use the highest Z-travel defined.

1 Product Description

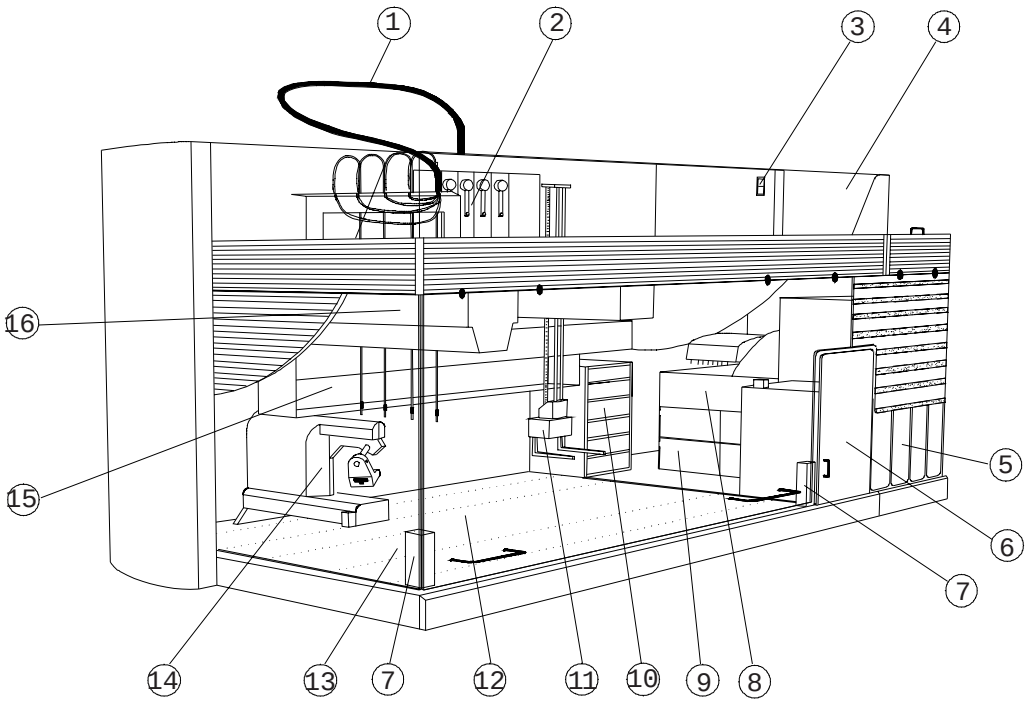
1.1 Introduction

1.1.1 GENESIS RMP Overview

The GENESIS RMP is a **R**obotic **M**icroplate **P**rocessor for ELISA (**E**nzyme **L**inked **I**mmuno **S**orbent **A**ssay) and ELISA-like tests. It is produced in three sizes (instrument width: 100, 150 and 200 cm respectively). It is equipped with a Robotic Manipulator Arm (RoMa) and a Liquid Handling Arm (LiHa) with 4 or 8 tips. Furthermore, the GENESIS RMP contains a room temperature incubator, a heated incubator, a reader, a washer, a shelf for 4, 6, 8 or 12 microplates and a barcode reader (PosID). The access door is secured with doorlocks (see figure 1-1). Optional, the instrument can be equipped with a second room temperature incubator and/or heated incubator.

The GENESIS RMP is operated via the Test Oriented Plate Scheduler (TOPS) Run Control software.

Figure 1-1 GENESIS RMP 150



1. *Pipeting tubing*
2. *Diluters*
3. *Main power switch*
4. *Top safety panel*
5. *Wash bottle rack*
6. *Loading Port (RT-Incubator)*
7. *Access door lock*
8. *Microplate Washer*
9. *Absorbace Reader*
10. *Incubator with optional shaker*
11. *Robotic Manipulator arm (RoMa)*
12. *Access door*
13. *Worktable*
14. *Positive identification (PosID)*
15. *Shelf*
16. *Liquid Handling arm (LiHa)*

1.1.2 Reference Documentation

Document		Doc. No.
Instrument Operating Manuals	GENESIS RMP Operating Manual	390 840
	Operating Manual for Columbus Washer	I 109 004
	Operating Manual for SUNRISE Remote Control	I137 301
	or	
	Operating Manual for Spectra & Rainbow Readers	I 139 003
Application Software Manual	GENESIS RMP TOPS Software Manual	390 837
Maintenance Logbook	GENESIS Service and Maintenance Logbook	390 924
Instrument Software Manual	GENESIS Instrument Software Manual	390 791

Manuals must be stored within reach of the instrument.

1.1.3 Intended Use

The GENESIS RMP (**R**obotic **M**icroplate **P**rocessor) is intended for fully automated processing of 96-well microplate based ELISA (**E**nzyme **L**inked **I**mmuno **S**orbent **A**ssay) and ELISA-like tests, starting from sample pipetting and ending with result reading.

The user is responsible for correctly applying the GENESIS RMP, according to all local, state and federal laws that may apply. All precautions must be followed to ensure safe operation of the instrument.

1.1.4 Precaution

Incorrect use of the GENESIS RMP may lead to false test results and may cause exposure of the operator to potentially dangerous compounds.

1.1.5 EU-Conformity

Please consult the Conformity Declaration, delivered with each unit by TECAN Schweiz AG, listing all applicable directives and standards.

1.1.6 Product Identification

The type plate is located at the rear right of the GENESIS RMP.

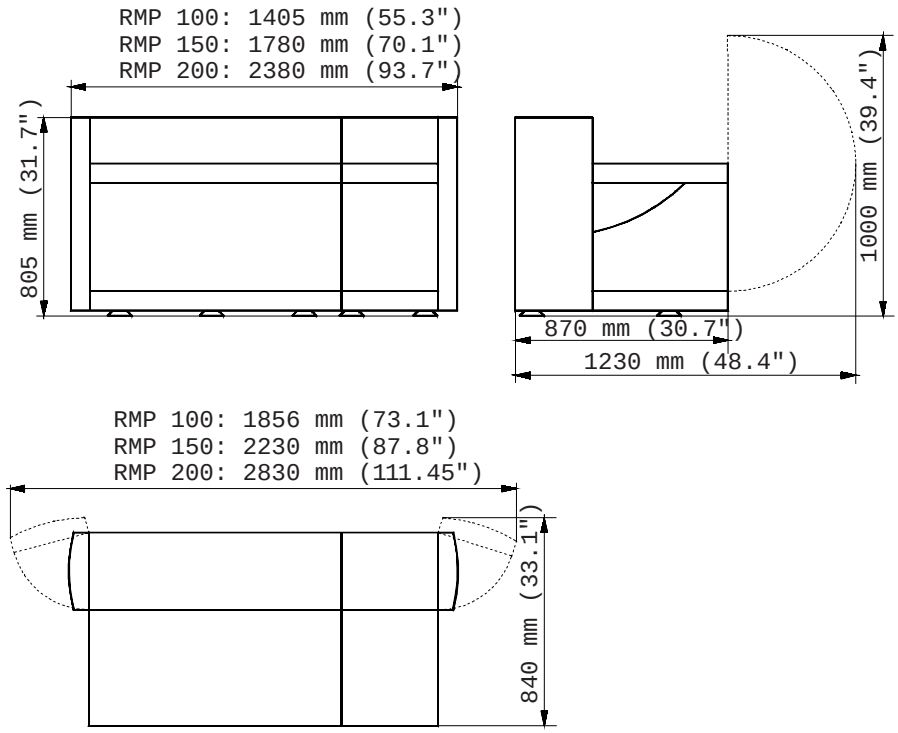
1.2 Minimal Computer Requirements

Hardware	Processor with clock rate > 200MHz, 128 MB RAM (at least 64MB RAM), monitor VGA 17", floppy disk drive 3.5 1.44 MB, CD rom drive, hard disk with > 500 MB free space, parallel interface (printer port) and two RS-232 interfaces. The PC must comply with the current Safety and EMC requirements for Information Technology Equipment (ITE) in accordance to the recognized standards EN 60950 (UL 1950), EN 55022, EN 50081-1 (FCC, Part 15, Class A) or equivalent.
Software	Windows NT 4.0 (with service pack 3 or higher)
Interface	RS-232 (use TECAN supplied cable only)
Installation	Set minimal virtual memory to 200 MB

1.3 Instrument specifications

1.3.1 GENESIS RMP Overall Dimensions

Figure 1-2 Instrument Dimensions



1.3.2 Worktable Dimensions

X-range RMP 100 X-range RMP 150 X-range RMP 200	550 mm (21.6") 24 grids 925 mm (36.4") 39 grids 1525 mm (60.0") 63 grids
Y-range	418 mm (16.5") total range from first to last tip 364 mm (14.35") common range for all tips (4 tip arm) 292 mm (11.5") common for all tips (8 tip arm)
Z-range	165 mm (6.5") with standard tip 185 mm (7.3") with DiTi 200 µl 150 mm (5.9") with DiTi 1000 µl

1.3.3 Weight

RMP 100 with PosID RMP 150 with PosID RMP 200 with PosID	166 kg (365 lb) 188 kg (414,4 lb) 241 kg (531,3 lb)

1.3.4 Supply Connections

Primary Voltage	100-240 VAC
Secondary Voltage	24 VDC
Line Frequency	50 - 60 Hz
Power	1000 VA
Ground Line	Must be connected
Circuit Breaker	10 A
Voltage Fluctuation	+ 10% and - 15%
Overvoltage Category	Class 2

To prevent interruptions in powersupply, the GENESIS RMP powersupply and computer must always run via an online UPS.

Output UPS: 1500 W / 2000 VA; 100-240 VAC;

Recommended back-up time: 8-15 min.;

Input voltage 200-240 VAC;

Phase: Single Phase.

1.3.5 Environmental Conditions

Storage Temperature	1° - 60° C (34° - 140°F)
Storage Humidity	5 - 80 % relative humidity at + 30° C (86° F)
Operation Temperature	18° - 30° C (65° - 86° F)
Operation Humidity	30 - 80% relative humidity at + 30° C (86° F) (non condensing)
Operational Height	Operation allowed up to 2500 m (8202 ft.) above sea level
Pollution Degree	2
Use	Indoor use only

1.3.6 Emissions

Noise

Maximum	70 dBA (1 m)

1.3.7 Modules

1.3.7.1 Liquid System

Volumes

Volumes in the range from 3 µl to 5000 µl (depending on syringe size) can be pipetted with standard tips and 3 to 1000 µl with disposable tips.

Liquid Detection

Less than 50 µl of conductive liquid in round-bottom microplates can be detected.

Precision

Precision in single pipetting mode with de-ionized water:

Volume	Tip	Precision
10 µl	Standard, DiTi 200	CV < 3%
100 µl	Standard, DiTi 200, DiTi 1000	CV < 0.5%

Carryover

Carryover is prevented best if disposable tips with filter are used. With stainless steel Teflon coated tips and use of the Monitored Pump Option (MPO), carryover of less than 10^{-6} can be achieved.

1.3.7.2 Diluter

Resolution	3000 steps per syringe stroke
Plunger Speed	1.2 sec/stroke to 10 min./stroke
Syringe Size 250 µl - 5.0 ml	250 µl - 5.0 ml
Plunger Travel Lenght	30 mm

1.3.7.3 Incubator

Temperature Range	Room temperature +5° .... 50° C (+41° F .... 125° F) or 50.1° C .... 60° C (122.2° F .... 140 °C)
Temperature Setting Steps	0.1° C (0.1° F)
Accuracy of Slot temperature	0.5° C at 37° C (0.5° F at 98.6° F)
Gradient over Microplate	0.5° C
Shaking Frequency Range	1 .... 8.2 Hz (8.2 Hz is default)
Amplitude	1 mm
Frequency Setting Steps	0.1 Hz
Supply Voltage Range	24 V ....26.4 VDC

1.3.7.4 PosID

Laser Class	Class 2
Power	0.95 mW max.
Wave Length	670 nm
Readable Barcode Types	Code 39 (length 0...32) Code 39 full ASCII Codabar (length 0...32) Code 128 (length 0...32) 2/5 Interleaved (length 0...30, even only) UPC-A (length not setable: 12) UPC-E (length not setable: 8) EAN-8 (length not setable: 8) EAN13 (length not setable: 13)

1.3.7.5 Reader

see Operating Manual for SUNRISE Remote Control (I 137 301) or Operating Manual for Spectra & Rainbow Readers (I 139 003).

1.3.7.6 Washer

see Operating Manual for Columbus Washer (I 109 004).

1.4 Equipment

1.4.1 Standard Delivery

A standard delivery follows the specifications on the order configuration sheet. Usually, it consists of a GENESIS RMP basic instrument, including RoMa, LiHa with tips, washer, reader, PosID, heated incubator, RT-incubator, 1 set of racks and software.

1.4.2 Accessories and Spare Parts

For a list of accessories and spare parts, please refer to chapter 12 of this document.

2 Safety Instructions

2.1 Introduction

2.1.1 Definition

Operator	:	Any person who uses the equipment for its intended purpose.
Service Technician	:	Person authorized by TECAN responsible for installation and initial start up of the instrument. Person to carry out service and maintenance task and therefore to be contacted in case of any problems with the system.

2.1.2 Target Group

The *GENESIS* RMP has been conceived for applications in the diagnostic and life science market, requiring qualified and authorized laboratory personnel.

Instrument operation requires thorough knowledge of applications, instrument functions and software programs as well as all applicable safety rules and regulations.

Qualification, Training

To be qualified for instrument operation, you must read and understand the written instructions in this Operating Manual, have appropriate training, and know the relevant safety rules and regulations.

2.1.3 Importance of the Safety Instructions

This chapter contains general information assuring safe operation of the instrument. More specific instructions with regard to safety are given throughout this manual, at the respective locations where observation is most important.

Make sure that all Safety Instructions in this publication are strictly followed.

2.2 Warnings, Cautions and Notes

Three types of informational notices are used in this manual. These notices highlight important information or warn the user of a potentially dangerous situation. The following notices will have the same level of importance throughout this manual:

Warning

Indicates the possibility of severe personal injury, loss of life or equipment damage if instructions are not followed.

Caution

Indicates the possibility of severe personal injury, loss of life or equipment damage if instructions are not followed.

Note: Gives helpful information about the equipment.

2.2.1 Barcode Scanner (PosID Option)

Laser Class 2. Laser light - do not look into the beam.
Migth be harmful fo your eyes.

To ensure proper operation, the Laser Beam Output Window must always be perfectly clean. Even slight soiling will cause reading errors.

2.2.2 Use of Mobile Phones

The use of mobile phones in the vicinity of the GENESIS RMP may cause false liquid detection. Mobile phones must be banned from the room in which a GENESIS RMP is installed.

Turn off mobile phones (no stand-by operation)!

3 Structure and Function

3.1 Introduction

The GENESIS RMP is a computer controlled liquid handling and microplate handling system with integrated barcode reader, microplate washer, absorbance reader and temperature controlled incubator.

The operator controls the system via a personal computer, equipped with the GENESIS Instrument Software as well as the TOPS Application Software.

3.2 Liquid System

The liquid system includes all instrument parts that contain or directly influence the liquid handling.

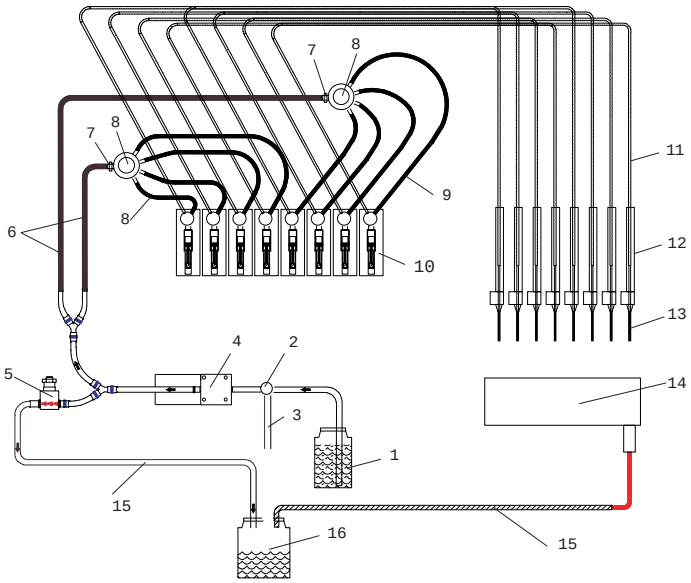
The maintenance of liquid system components in proper operating conditions is essential to the pipetting performances of the instrument (see chapter 7).

3.2.1 Principle of Functioning

Figure 3-1 shows the schematic diagram of the instrument liquid system. The liquid system comprises the central components for the GENESIS pipetting functionality. It transmits the precise movement of the diluter to the tips through the system liquid.

The system liquid is delivered to the system in a container and is aspirated and distributed within the whole system via tubes, valves and connectors. The distribution of the system liquid is effected by the movement of the diluter pistons in several pulses and driven by the fast wash pump.

Figure 3-1 GENESIS RMP Liquid System



1 *System liquid container*
2 *Valve (used for empty system liquid container)*
3 *Tubing used for flushing*
4 *Fast wash pump*
5 *Pressure-relief valve*
6 *Aspirating tubing*
7 *Pressure clamps*
8 *Liquid distributor*
9 *Interconnect tubing*
10 *Diluter*
11 *Pipetting tubing*
12 *Z-Rack*
13 *Pipetting tip*
14 *Wash station*
15 *Waste tubing*
16 *Waste container*

3.2.2 System Liquid

System liquid refers to a liquid that fills the liquid system and is used as wash fluid and/ or can be added to several or all samples analogously to the additive.

Standard system liquid:

- De-ionized water or aqueous buffer solution.
- Saline.

3.2.3 Liquid Level Monitoring

The system liquid level and the waste liquid level are monitored with the help of the **Li**quid **Co**ntainer **S**upervisor (LICOS). The LICOS is a tube, closed at one end with a pressure sensor. It is placed upright in the liquid sytem bottle and waste bottle. When the liquid container is empty, the pressure in the tube equals ambient pressure. Increasing liquid levels in the liquid container increase the pressure on the aircolumn in the LICOS tube, which is detected by the pressure sensor. By calibrating the LICOS with an empty and full liquid container the pressure values for 'empty' and 'full' are set.

3.2.4 Liquid Detection

Each pipetting channel has an individual liquid detection. Generally, detection of conductive liquids of following volumes is possible:

- ≥ 50 µl microplates with round bottoms
- ≥ 20 µl conductive liquid microplates with round bottoms

Each tip is connected to an integrated liquid detector module (ILID). Tips detect the surface of conductive solutions upon contact.

The liquid detectors operate by monitoring the capacity difference between the tip and the instrument working surface. When a tip touches the liquid surface, the ILID detects the change in capacity and triggers a detection signal.

A signal is produced both when moving into a liquid and when coming out. This feature allows the detection of aspirated blood clots:

- The software stores the position at which the liquid detection signal did occur
- Using the aspirated volume and the vial diameter, it calculates the point at which the liquid detection signal should be interrupted
- A tolerance for cohesion and hysteresis effects is taken into account. If the interuption signal occurs past this tolerance, it is assumed that a clot has been aspirated

The liquid detection feature offers the following advantages:

- Minimum submerge depth of the pipette tips
- Minimal tip contamination and therefore only limited need for tip washing
- Appropriate message if no liquid or not enough liquid available for sampling
- Software controlled, constant submerge depth during aspirating and dispensing
- Clot detection

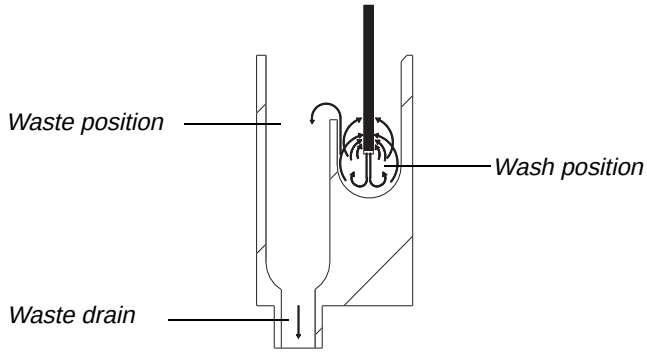
3.2.5 Wash / Waste Station

The wash / waste station is placed on the worktable of the GENESIS RMP and is used for:

- Cleaning of fixed tips between pipetting steps in order to reduce the possibility of carry-over
- Discarding of waste liquid

The wash / waste station principle is shown in figure 3-2.

Figure 3-2 Wash / Waste Station Principle



3.3 Hardware System Modules

The GENESIS RMP hardware is based on a modular design concept in which each of the major functions is performed by a modular component of the instrument.

3.3.1 Liquid Handling Arm, LiHa

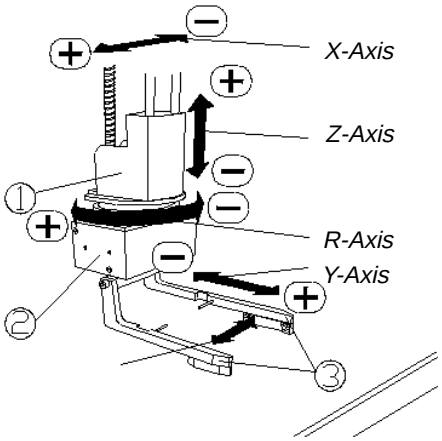
The GENESIS RMP is standardly equipped with a liquid handling arm.

Four or eight pipetting tips are arranged on the LiHa that can move independently in Z-direction (up and down). In Y-direction (front-rear) an equidistant tip spreading of 9 - 38 mm (0.31 - 1.5 inches) is possible. The complete liquid handling arm moves left and right (X-direction) across the entire worktable.

3.3.2 Robotic Manipulator Arm, RoMa

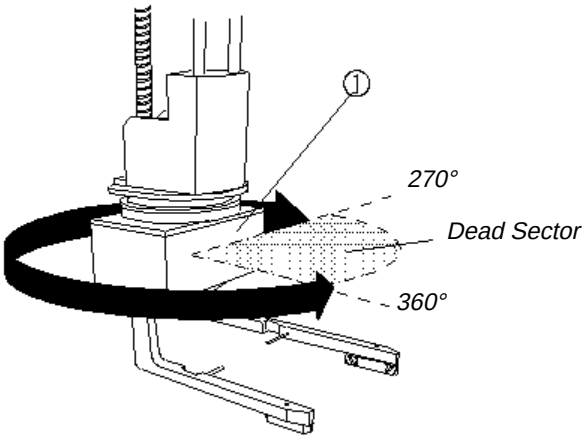
The robotic manipulator arm is used to transport microplates, reagent blocks, deep well plates, etc. to different positions on the worktable or for storage onto the shelf. The RoMa coordinate system consists of four axes; the X-axis, the Y-axis and the Z-axis defining linear movements and the R-axis defining rotational movements (figure 3-3). The RoMa Gripper (figure 3-3and 3-4) moves clockwise from 0°....270° (figure 3-4). A dead sector of 90° (between 270° and 360°) cannot be accessed by the RoMa Gripper (figure 3-4).

Figure 3-3 RoMa Coordinate System



1. Rotator
2. Gripper
3. Gripper fingers

Figure 3-4 RoMa Coordinate System (Dead Sector)



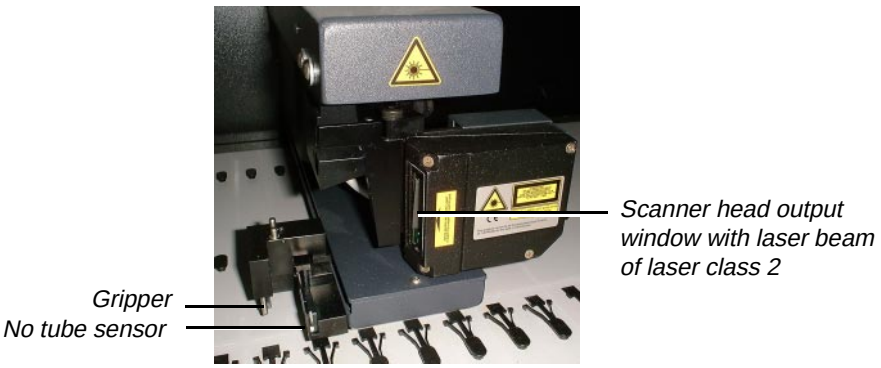
1. Gripper

3.3.3 Positive Identification, PosID

The optional positive identification reads barcodes on carriers, racks and containers.

With its gripper it pulles carriers towards the rear of the instrument for barcode identification on tubes and microplates and than pushes the carrier back into the operating position.

Figure 3-5 Positive Identification, PosID



3.3.4 Colombus Microplate Washer

The microplate washer is loaded and unloaded by the RoMa and can be equipped with an 8-fold or 16-fold wash head (with 1 aspirating and 1 dispensing needle for each well). During the wash of a microplate the fill verification can be activated for each individual nozzle of the wash manifold to detect possible clogged tips. Four different wash liquids (holding 2 liters each) can be placed on the front rack of the add-on module. A hall sensor to make sure that there is enough wash liquid during a run supervises the liquid level in the bottles. It is possible to place the wash liquids into more than one bottle, If the first bottle gets empty the washer will switch automatically to the next one.

The microplate washer additionally offers the possibility of shaking plates in three different modes during the soak time of a wash cycle to enhance the wash procedure. The CV of the dispensing pump is less than 4%.

3.3.5 Sunrise (Spectra) Microplate Reader

The microplate reader is loaded and unloaded by the RoMa. It can be used with four different filters simultaneously. The filter wavelengths can be chosen between 340 nm and 700 nm. The measurement range of the Sunrise / Spectra is between 0 and 4 OD with linearity CV below 2% and a precision CV below 1%. The accuracy of the reader is more than 99%. Measurements can be done with a reference wavelength simultaneously. When tests with colored reagent and sample addition monitoring systems are used, a dispense check of the pipetting device can be defined as an individual action. In addition, four different shake modes ranging from 2 to 16 Hz with freely definable shaking times can be chosen to mix the liquid in the plates right before the measurement. This shaking option of the Spectra can also be used for a short mix at any time during the process of a test.

3.3.6 Room Temperature Incubator

The darkened room temperature incubator for up to 6 microplates is accessible from the front for manual loading. So the loading port and the room temperature incubator are the same device. The RoMa has access to the microplates from the backside of the incubator to unload the plates when they will be used during a run. The RoMa opens the doors passively when entering the incubator. After leaving the incubator, the doors will be closed automatically by a solenoid. An automated locking mechanism locks the front door while the RoMa access the plates. Plates will be placed back into the incubator for room temperature incubation or at the end of a run. The six slots are separated completely from each other to prevent a potential influence of processed and unprocessed plates sharing a common atmosphere. On the top of the room temperature incubator there is a loading port for taking out or placing back a microplate during a run if a manual step is defined in the test. If you need to load more than 6 plates you can place another room temperature incubator on the left side of the first one. This doubles your throughput capability to 12 plates.

3.3.7 Shaker / Heated Incubator

The shaker / heated incubator is placed opposite the room temperature incubator at the backside of the instrument. Six individually heatable slots allow different temperatures for each slot from 5°C above ambient temperature up to 50 °C, respectively from 50.1°C up to 60°C in 0.1°C increments. The heated incubator can be calibrated at 37°C (for normal assays) and 46°C (for special applications). Two ceramic heating plates, one at the bottom and one at the top of each slot, prevent the condensing of any evaporated liquid. The evaporation of water in the plates is below 1% during one hour for a plate filled with 200 µl per well at 37°C.

The door mechanism is identical to the one of the room temperature incubator, so the plates are kept dark during incubation. The warm up time from room temperature to 37°C is less than 10 minutes. The powerful electronics shorten the warm up time for each new loaded plate with room temperature liquid by enhancing the heating power with simultaneous prevention of an overheat. The temperature gradient over a plate is below +/- 0.5°C. Additionally, an optional shaking feature of the incubator is available. The whole incubator shakes in a linear mode with amplitude of 1mm and an adjustable frequency between 1 and 10 Hz. The default value is 8.2 Hz. Every slot may be used for different microplates depending on the temperature. Therefore it is possible to process more than six plates with one heated incubator only. However if you need a higher throughput you may place a second incubator on the left side of the first one.

4 Operating Keys, Display, Operating Modes

4.1 Introduction

For installation and operating instructions refer to chapter 5 and chapter 6 of this manual.

4.2 Warning Signals

If errors occur during a run, TOPS Run Control produces an audio signal to warn the operator. If an alarm device is installed, the audio signal is accompanied by a light signal.

4.3 Operating Keys

The main power switch (see figure 4-1) is the only operating key on the GENESIS RMP. In cases of emergency it serves as Emergency Off switch.

The main power switch is located at the instrument's upper right corner. A green LED indicates if the instrument is switched on. The green LED is dark if the instrument is switched off.

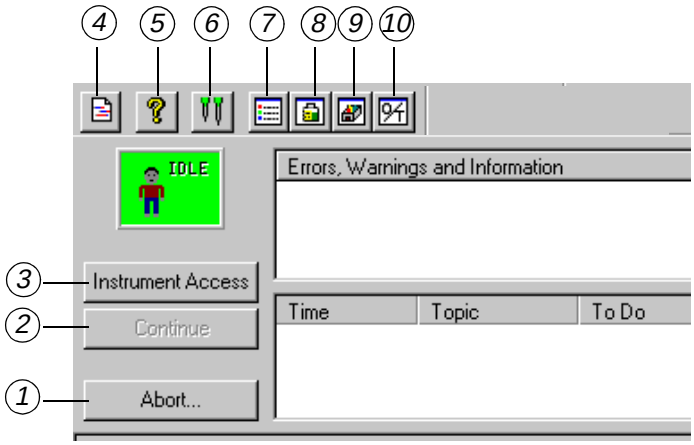
Figure 4-1 On / Off Switch

The GENESIS RMP is controlled via the TOPS software package (see chapter 6 and the GENESIS RMP TOPS Software Manual 390 837).

4.4 Display

The user interface of the TOPS Run Control software (see figure 4-2) serves as operational display element for the GENESIS RMP.

Figure 4-2 TOPS Run Control 'Display Elements'



1 *Aborts the current action, a test or the profile.*
2 *Continues a run after instrument access or error.*
3 *Allows instrument access.*
4 *Starts a new run.*
5 *Provides information about TOPS.*
6 *Allows to refill DiTi's. Only active after instrument access.*
7 *Color legend for run schedule.*
8 *Placement of global liquids.*
9 *Placement of testkits and disposable racks.*
10 *Overview of orders per test.*

Further function of TOPS Run Control are described in chapter 6 and 7 of this manual.

4.5 Malfunction Indicators

Two LED indicators on top of the instrument CU board (open the left access door) indicate the state of the system. Table 4 - 3 lists the different states and interpretation.

Table 4 - 3 LED Indicators

Green LED	Red LED	Meaning
Blinks (ca. 2 Hz)	Off	Status OK
No blinking	No blinking	Fatal hardware problem
Blinks (ca. 2 Hz)	Blinks a-synchronously	Too many options connected
Blinks (ca. 2 Hz)	On	EEPROM problem
Blinks (ca. 10 Hz)	Blinks (ca. 10 Hz)	Firmware download in progress
Blinks (ca. 2 Hz)	Blinks (ca. 2 Hz)	Powerfail of powersupply active

1 Hz = 1 blink per second

4.6 Operation Modes

4.6.1 Introduction

TOPS Run Control can work in three operation modes (see also paragraph 6.2.3):

- No worklist — Paragraph 4.6.2
- Worklist — Paragraph 4.6.3
- Worklist Query mode — Paragraph 4.6.4

The operation mode cannot be changed via TOPS Run Control. It is defined by the profile to be run.

4.6.2 No Worklist

In the 'no worklist' operation mode, no external worklist is available. The operator creates a worklist in TOPS Run Control by allocating groups of samples (sample batches) to the respective tests to be performed.

4.6.3 Worklist

In the 'worklist' operation mode, an external worklist is imported in TOPS Run Control. The operator can modify the worklist.

4.6.4 Worklist Query Mode with Worklist Editor

In the 'worklist query mode' operation mode, no external worklist is available. The operator creates a worklist in TOPS Run Control by allocating single samples to the respective tests to be performed.

5 Installation

The initial installation of a GENESIS RMP or an optional module must be carried out by a TECAN authorized service technician according to separate instructions available to service technicians only.

6 Operation

6.1 Introduction

6.1.1 Safety Instructions

Carefully read the safety instructions in chapter 2 before operating the GENESIS RMP.

Warning:

The PosID produces laser class 2 laser light. This is harmfull to your eyes.

Do not look into the beam.

Prohibition:

The use of mobile phones in the vicinity of the GENESIS RMP may cause false liquid detection.

Keep mobile phones out of the room in which a GENESIS RMP is installed (no stand-by operation allowed!).

6.1.2 Operator Qualification

Instrument operation requires thorough knowledge of applications, instrument functions and software programs as well as all applicable safety rules and regulations. The instrument shall be operated under consideration of this operating manual and by qualified and authorized laboratory personnel only.

TECAN regularly offers Operator Training Courses. We highly recommend to attend such a course prior to working with the TECAN instrument.

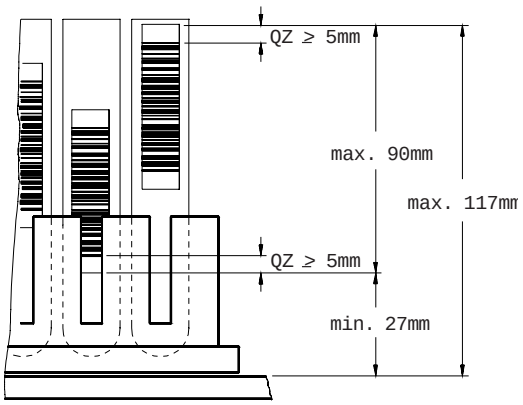
6.2 Operation

6.2.1 Instrument Setup

6.2.1.1 Placing Barcode Labels on Carriers, Racks and Containers

Figures 6-1, 6-2 and 6-3 show how to place the barcode stickers onto the carriers, racks and containers such that the barcodes can be read properly by the PosID.

Figure 6-1 Barcode Position on Tubes



QZ: Quiet Zone

Quiet zone: white area on the barcode label. Needed for the PosID to be able to calibrate. If the quiet zone is too small, the PosID cannot read the barcodes.

Figure 6-2 Barcode Position on Reagent Trough

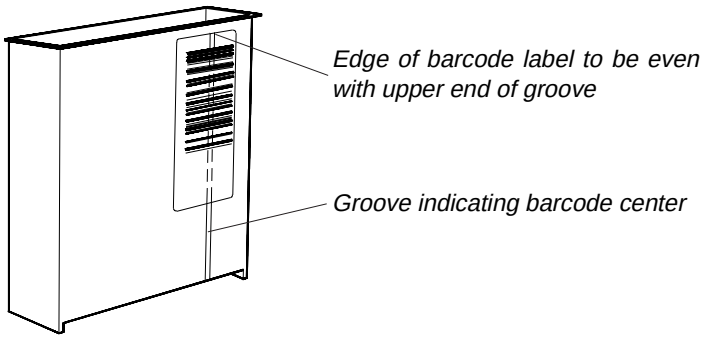
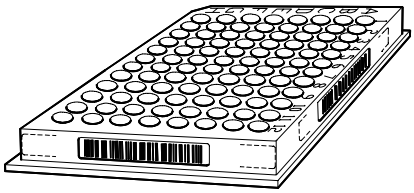


Figure 6-3 Microplate Barcode Position

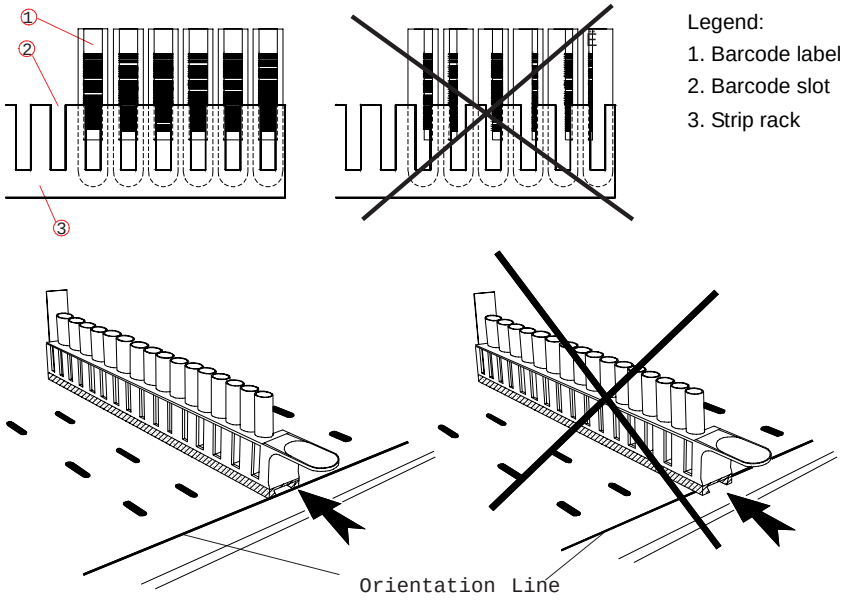


Placement of barcode label: centred

6.2.1.2 Placing Carriers, Racks and Containers onto the Worktable

Carriers, racks and containers are to be placed on the worktable as shown in figure 6-4.

Figure 6-4 Placing Carriers, Racks and Containers onto the Worktable



6.2.1.3 Preparing the Pipetting System

Before operating the GENESIS RMP perform the daily maintenance procedures as described in Chapter 7.

6.2.2 Switching on the GENESIS RMP

The GENESIS RMP is switched on via the main power switch (see figure 1-1).

- Wait untill the green light above the main power switch is lit.
- Switch on the PC connected to the GENESIS RMP.

6.2.3 Setting up a Run

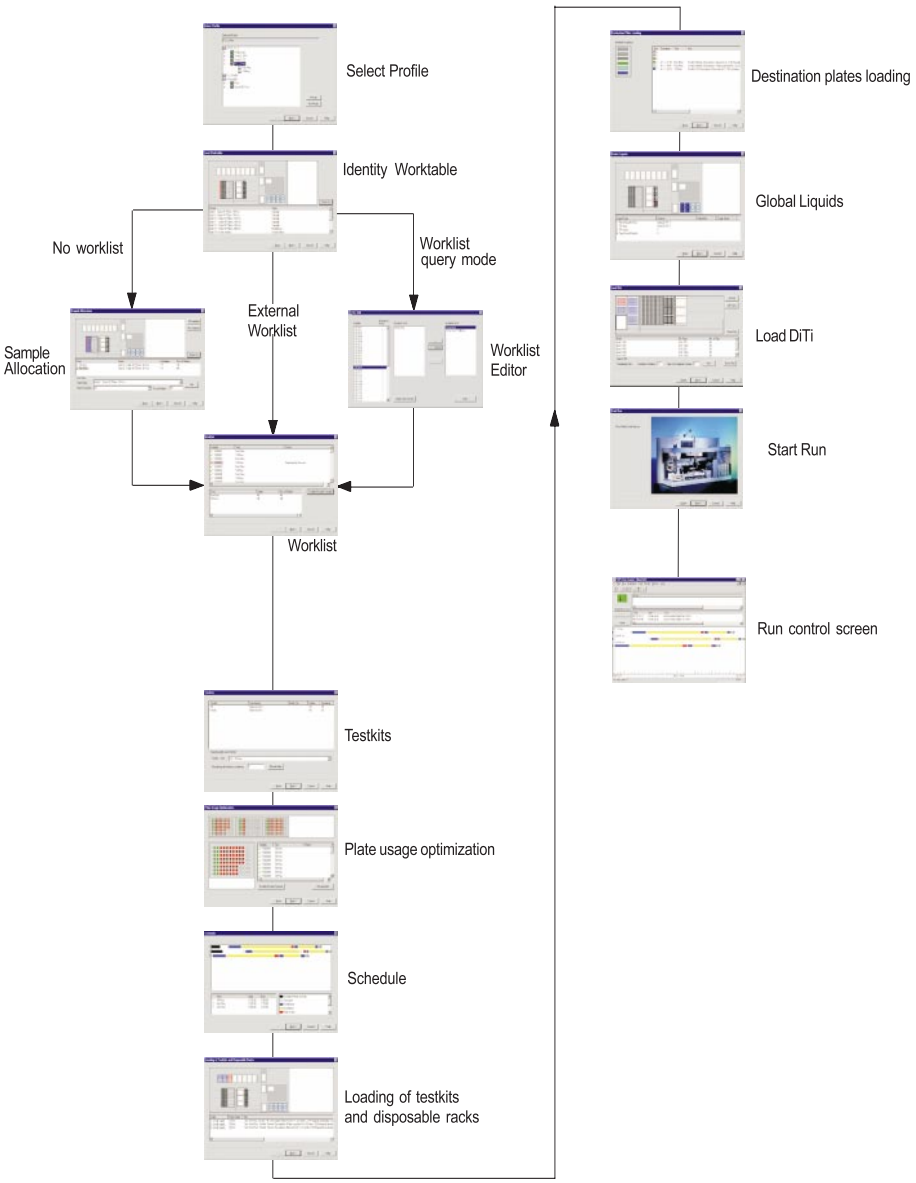
6.2.3.1 Introduction

The GENESIS RMP instrument is operated via the TOPS Run Control software. A run is set up based on a predefined profile that contains a selection of tests. Three operation modes are available:

- No worklist (no external worklist available) see paragraph 6.2.3.2
- Worklist (external worklist is imported) see paragraph 6.2.3.3
- Worklist query mode with worklist editor (worklist generated manually)see paragraph 6.2.3.4

The setup sequence for running a profile in TOPS Run Control is shown in figure 6-5.

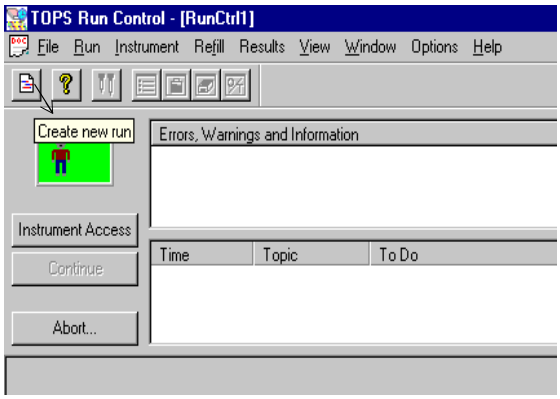
Figure 6-5 Setup Sequence for running a Profile in TOPS Run Control



6.2.3.2 Setting up a Run: No Worklist

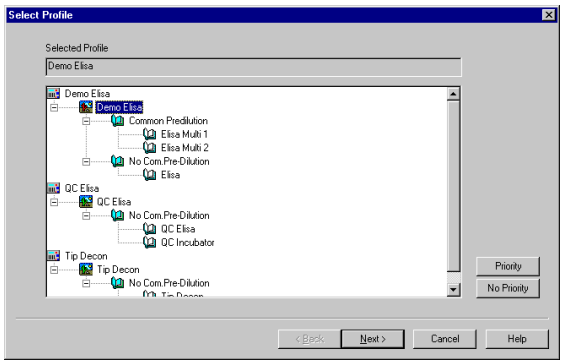
To set up a new run, proceed as follows:

Start TOPS Run Control by double clicking the Run Control Icon.



The Run Control main menu appears.

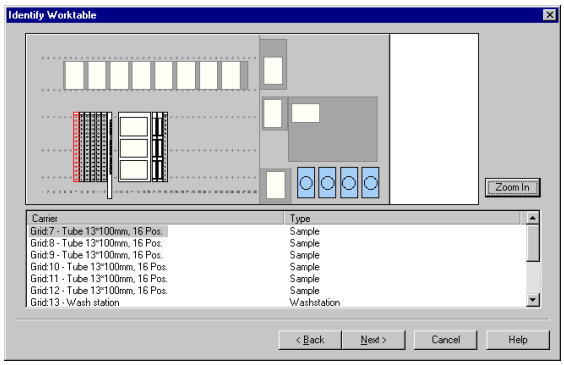
- Click the 'Create new run' button.



Dialog screen 'Select Profile' appears.

- Select the profile to be run.
- To set tests on priority: select the test and click 'Priority'.
- Click 'Next>'

'Priority': For tests set on priority the sample distribution is processed first.



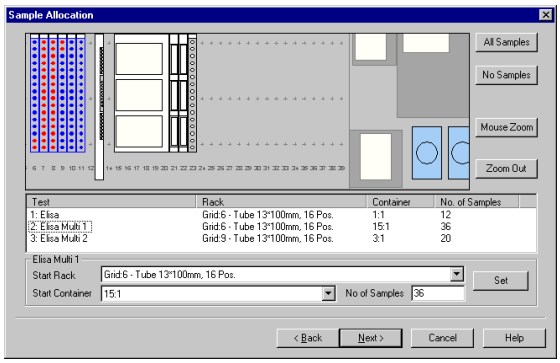
Dialog screen 'Identify Worktable' appears.

- Place all racks and carriers on the worktable as indicated on the screen.
- Close the front access door.
- Click 'Next>'

If for the current run, less sample carriers are needed than indicated on the screen, place only the number of carriers required for this run onto the worktable.

- The GENESIS RMP is initialized.
- The PosID reads all barcodes.
- The Columbus Washer is rinsed.
- Perform the daily maintenance procedures

If not all barcodes could be read: see paragraph 6.2.3.5.

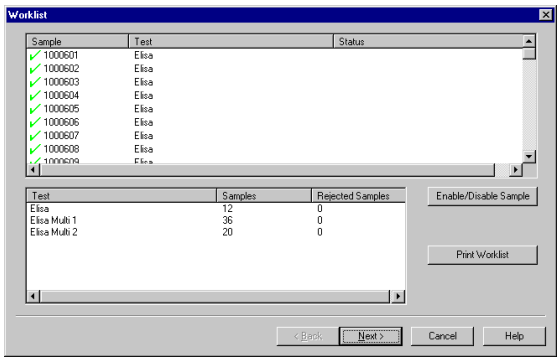


Dialog screen 'Sample Allocation' appears.

- Select one or several tests by clicking on them.
- Define the position of the first sample to be tested ('Start Rack' and 'Start Container').
- Enter the number of samples to be tested ('No of Samples').
- Click 'Set'.
- Repeat the above untill the samples are allocated to the tests that will be processed in the run to start.
- Click 'Next>'.

'All Samples': All samples will be allocated to all tests.

'No Samples': Clear current allocation.



Dialog screen 'Worklist' appears.

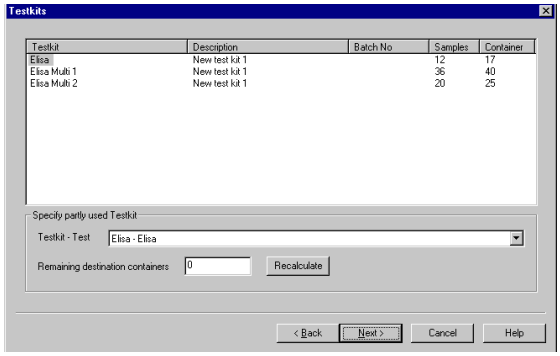
To disable specific samples (test will not be performed):

- Select sample to be disabled by clicking on it.
- Click 'Enable/Disable Sample'.
- Click 'Next>'.

'Samples' : current number of samples to be tested.

'Rejected Samples':: number of samples including disabled samples.

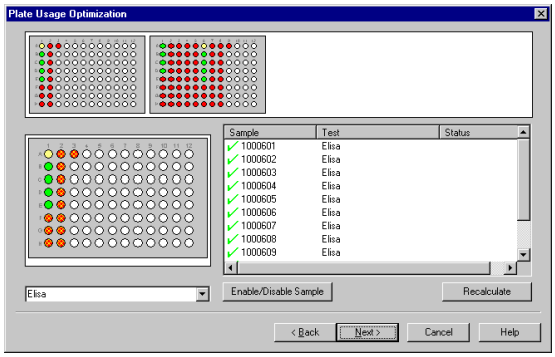
To sort: click column header.



Dialog screen 'Testkits' appears.

To specify a partly used testkit:

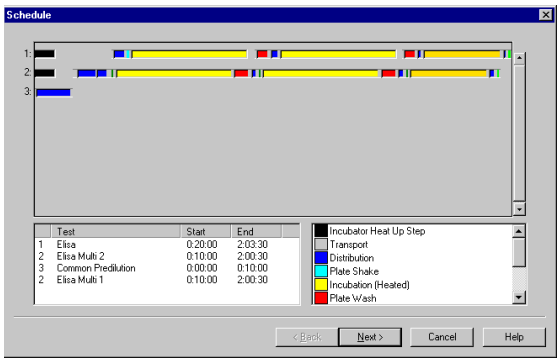
- Select the testkit to be specified by clicking on it.
- Type in the number of destination containers that can still be processed with the kit.
- Click 'Recalculate'.
- Click 'Next>'.



Dialog screen 'Plate Usage Optimization' appears.

- Click on one of the microplates to view the the plate layout.
- Select a sample to be disabled by clicking on it.
- Disable the sample by clicking 'Enable/ Disable Sample'.
- Click 'Recalculate': plate usage is recalculated after samples have been disabled.
- Click 'Next>'.

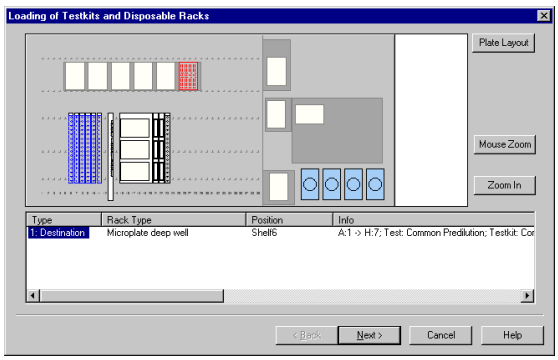
green : controls
yellow : blancs
red : samples
white : not in use



Dialog screen 'Schedule' appears.

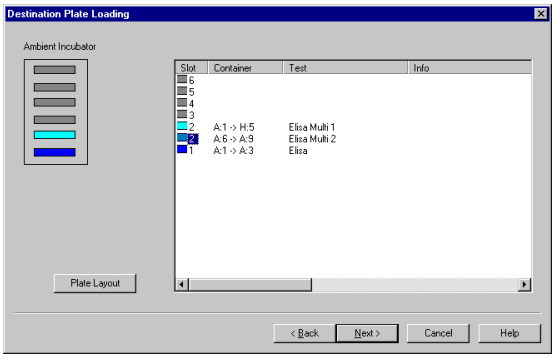
The schedule gives an overview of the pre-calculated start and endtimes of the tests.

- Click 'Next>'.



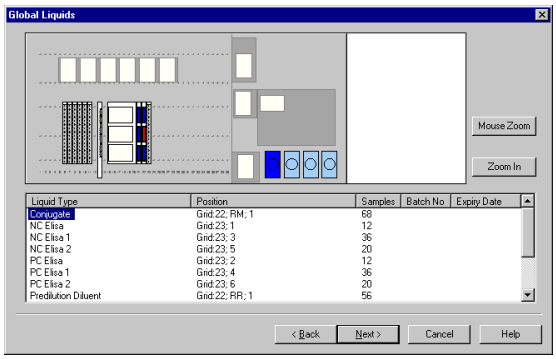
Dialog screen 'Loading of Testkits and Disposable Racks' appears.

- Place all testkit racks (destination racks, predilution racks, transportable reagent racks) on the worktable as indicated on the screen.
- Click 'Next>'



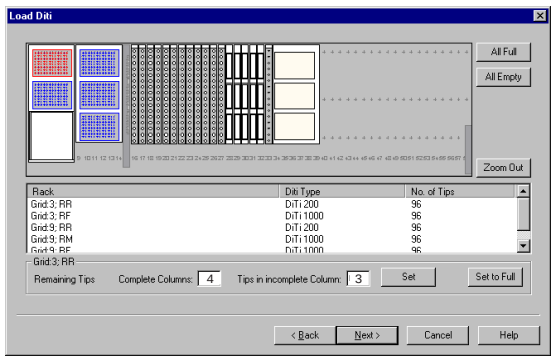
Dialog screen 'Destination Plate Loading' appears.

- Load the destination plates as indicated on the screen.
- To view plate layout select the plate to be viewed by clicking on it and click 'Plate Layout'.
- Click 'Next>'



Dialog screen 'Global Liquids' appears.

- Place the global liquids in the containers as indicated on the screen.
- Click 'Next>'

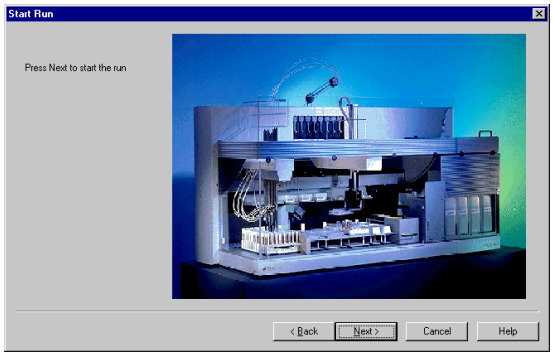


Dialog screen 'Load DiTi' appears (only if a profile was chosen that uses DiTi's).

- Select the DiTi rack to be defined by clicking on it.
- Type in the number of 'Complete Columns' and the number of 'Tips in incomplete Column'.
- Click 'Set'.
- If the selected DiTi rack is full: click 'Set to Full'.

'All Full' : All DiTi racks will be set to full.

Disposable Tips are always picked from left to right and from rear to front. Make sure that partly used DiTi racks are filled up in this direction.



Dialog screen 'Start Run' appears.

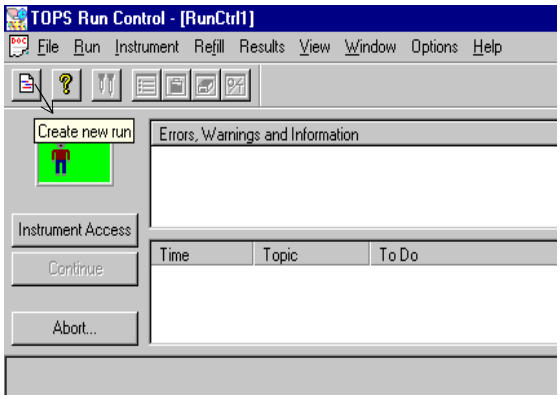
- Click 'Next>'

The run is started. See paragraph 6.2.4.

6.2.3.3 Setting up a Run: Worklist

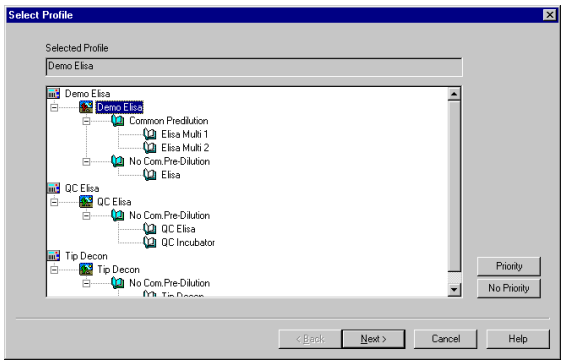
To set up a new run, proceed as follows:

Start TOPS Run Control by double clicking the Run Control Icon.



The Run Control main menu appears.

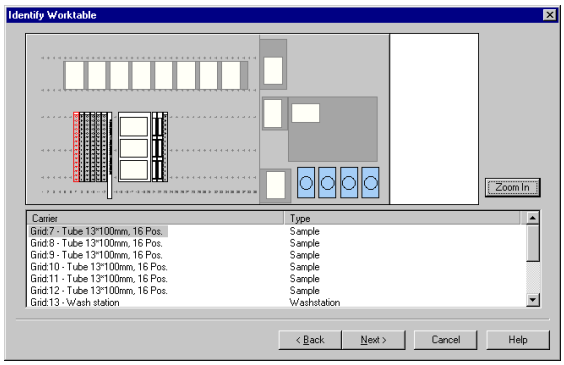
- Click the 'Create new run' button.



Dialog screen 'Select Profile' appears.

- Select the profile to be run.
- To set tests on priority: select the test and click 'Priority'.
- Click 'Next>'

'Priority': For tests set on priority the sample distribution is processed first.



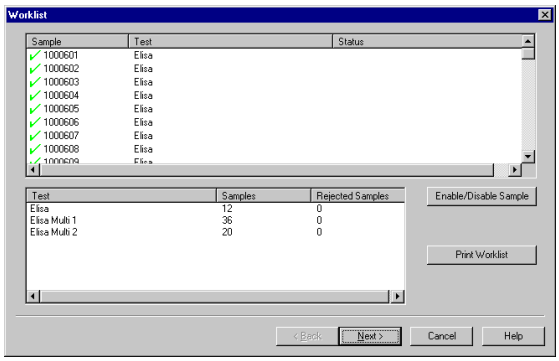
Dialog screen 'Identify Worktable' appears.

- Place all racks and carriers on the worktable as indicated on the screen.
- Close the front access door.
- Click 'Next>'

If for the current run, less sample carriers are needed than indicated on the screen, place only the number of carriers required for this run onto the worktable.

- The GENESIS RMP is initialized.
- The PosID reads all barcodes.
- The Columbus Washer is rinsed.
- Perform the daily maintenance procedures

If not all barcodes could be read: see paragraph 6.2.3.5*.*



Dialog screen 'Worklist' appears.

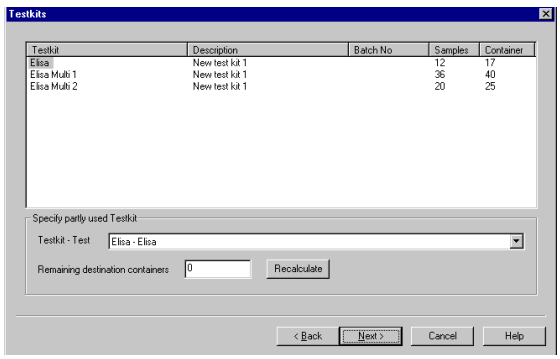
To disable specific samples (test will not be performed):

- Select sample to be disabled by clicking on it.
- Click 'Enable/Disable Sample'.
- Click 'Next>'.

'Orders' : current number of samples to be tested.

'No. of Orders ': number of samples including disabled samples.

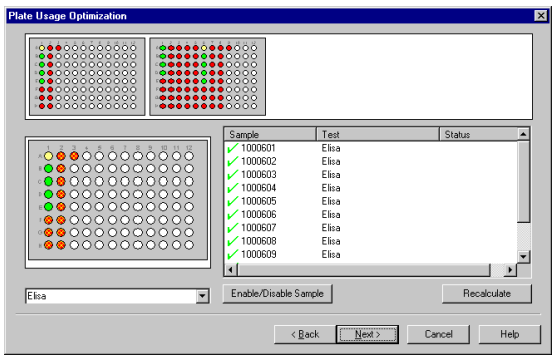
To sort: click column header.



Dialog screen 'Testkits' appears.

To specify a partly used testkit:

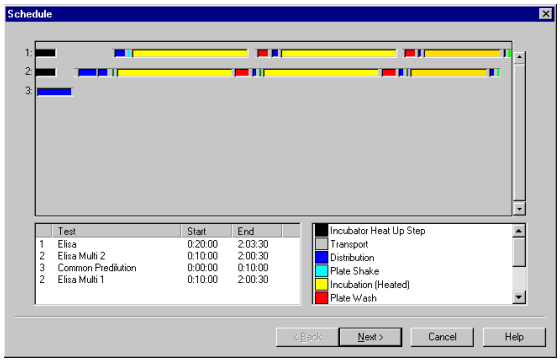
- Select the testkit to be specified by clicking on it.
- Type in the number of destination containers that can still be processed with the kit.
- Click 'Recalculate'.
- Click 'Next>'.



Dialog screen 'Plate Usage Optimization' appears.

- Click on one of the microplates to view the the plate layout.
- Select a sample to be disabled by clicking on it.
- Disable the sample by clicking 'Enable/ Disable Sample'.
- Click 'Recalculate': plate usage is recalculated after samples have been disabled.
- Click 'Next>'.

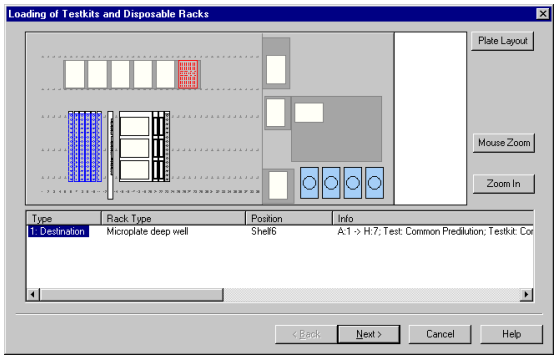
green : controls
yellow : blancs
red : samples
white : not in use



Dialog screen 'Schedule' appears.

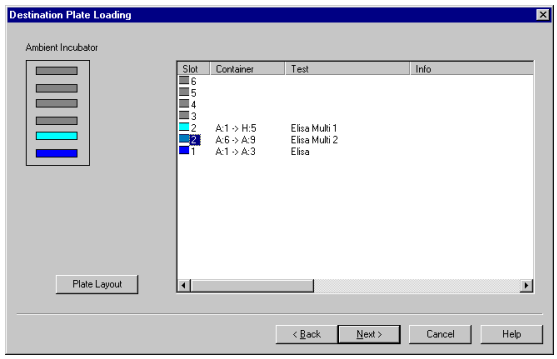
The schedule gives an overview of the pre-calculated start and endtimes of the tests.

- Click 'Next>'.



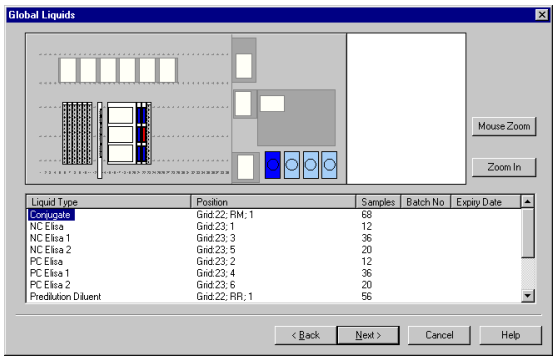
Dialog screen 'Loading of Testkits and Disposable Racks' appears.

- Place all testkit racks (destination racks, predilution racks, transportable reagent racks) on the worktable as indicated on the screen.
- Click 'Next>'



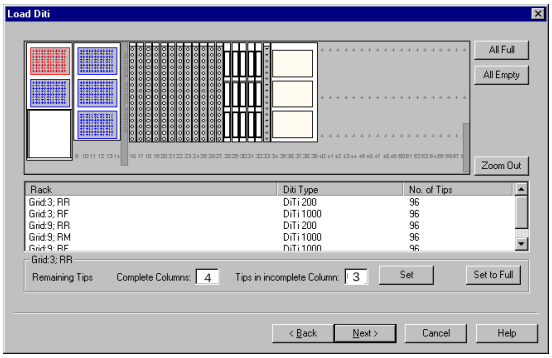
Dialog screen 'Destination Plate Loading' appears.

- Load the destination plates as indicated on the screen.
- To view plate layout select the plate to be viewed by clicking on it and click 'Plate Layout'.
- Click 'Next>'



Dialog screen 'Global Liquids' appears.

- Place the global liquids in the containers as indicated on the screen.
- Click 'Next>'

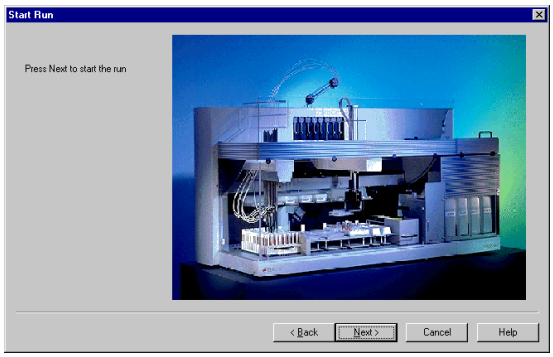


Dialog screen 'Load DiTi' appears (only if a profile was chosen that uses DiTi's).

- Select the DiTi rack to be defined by clicking on it.
- Type in the number of 'Complete Columns' and the number of 'Tips in incomplete Column'.
- Click 'Set'.
- If the selected DiTi rack is full: click 'Set to Full'.

'All Full' : All DiTi racks will be set to full.

Disposable Tips are always picked from left to right and from rear to front. Make sure that partly used DiTi racks are filled up in this direction.



Dialog screen 'Start Run' appears.

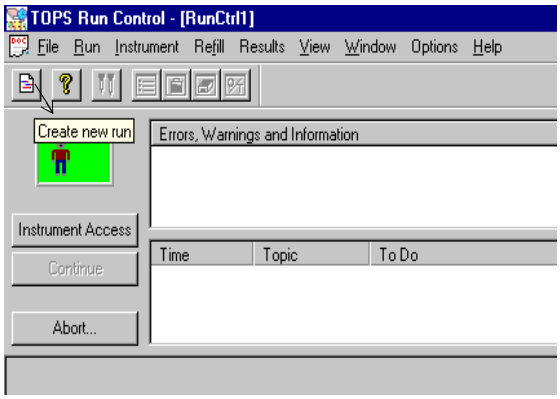
- Click 'Next>'

The run is started. See paragraph 6.2.4.

6.2.3.4 Setting up a Run: Worklist Query Mode with Worklist Editor

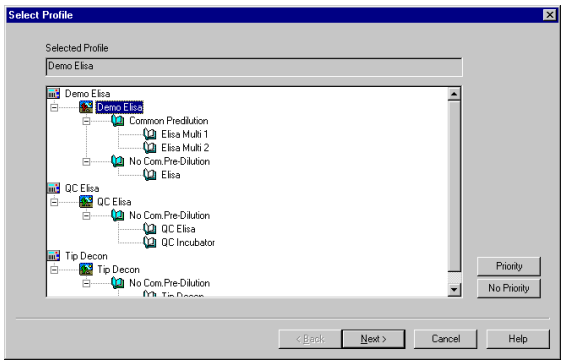
To set up a new run, proceed as follows:

Start TOPS Run Control by double clicking the Run Control Icon.



The Run Control main menu appears.

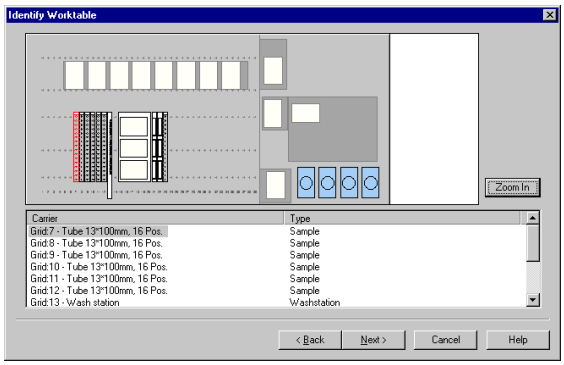
- Click the 'Create new run' button.



Dialog screen 'Select Profile' appears.

- Select the profile to be run.
- To set tests on priority: select the test and click 'Priority'.
- Click 'Next>'

'Priority': For tests set on priority the sample distribution is processed first.



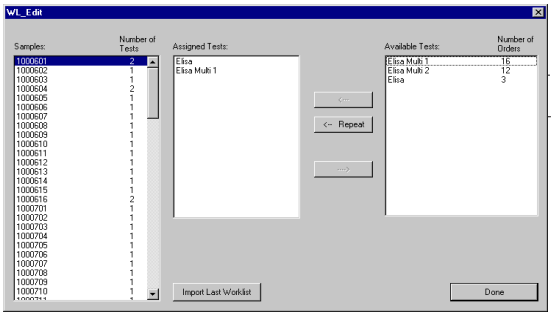
Dialog screen 'Identify Worktable' appears.

- Place all racks and carriers on the worktable as indicated on the screen.
- Close the front access door.
- Click 'Next>'

If for the current run, less sample carriers are needed than indicated on the screen, place only the number of carriers required for this run onto the worktable.

- The GENESIS RMP is initialized.
- The PosID reads all barcodes.
- The Columbus Washer is rinsed.
- Perform the daily maintenance procedures

If not all barcodes could be read: see paragraph 6.2.3.5*.*

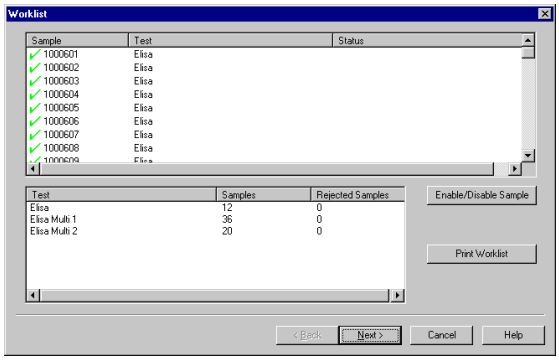


Dialog screen 'WL_Edit' appears.

- Select a sample by clicking on it.
- Select a test from the 'Available Tests' window by clicking on it.
- To assign the test to the sample shift the test to the 'Assigned Tests' window by clicking th arrow button.

'Repeat': repeats the last assignment.

'Import Last Worklist': the last worklist that was used in TOPS Run Control will be imported.



Dialog screen 'Worklist' appears.

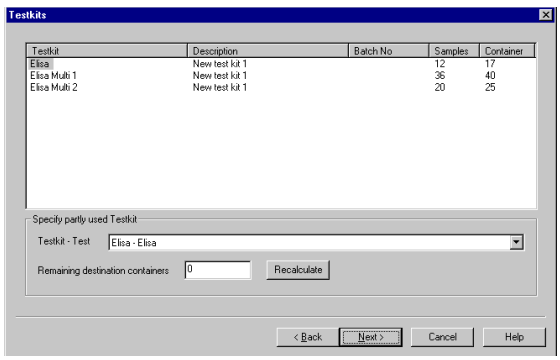
To disable specific samples (test will not be performed):

- Select sample to be disabled by clicking on it.
- Click 'Enable/Disable Sample'.
- Click 'Next>'.

'Samples' : current number of samples to be tested.

'Rejected Samples':: number of samples including disabled samples.

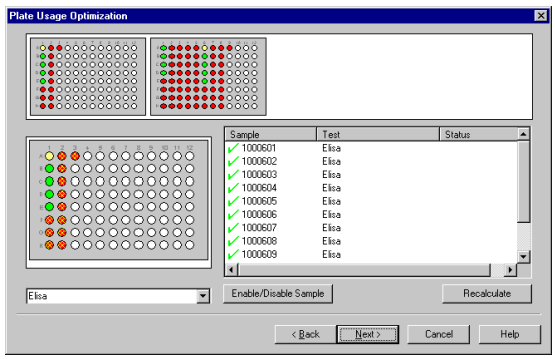
To sort: click column header.



Dialog screen 'Testkits' appears.

To specify a partly used testkit:

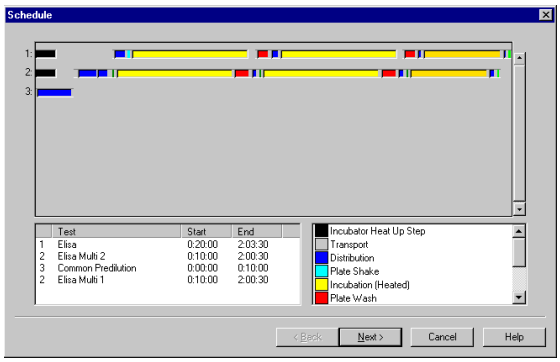
- Select the testkit to be specified by clicking on it.
- Type in the number of destination containers that can still be processed with the kit.
- Click 'Recalculate'.
- Click 'Next>'.



Dialog screen 'Plate Usage Optimization' appears.

- Click on one of the microplates to view the the plate layout.
- Select a sample to be disabled by clicking on it.
- Disable the sample by clicking 'Enable/ Disable Sample'.
- Click 'Recalculate': plate usage is recalculated after samples have been disabled.
- Click 'Next>'.

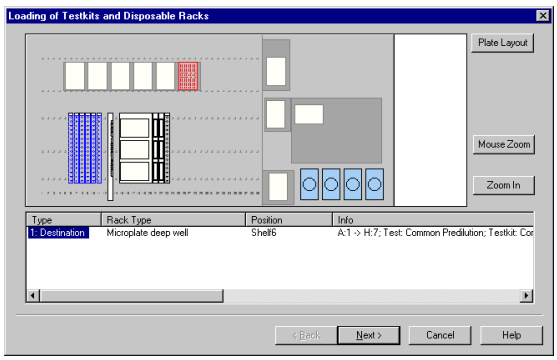
green : controls
yellow : blancs
red : samples
white : not in use



Dialog screen 'Schedule' appears.

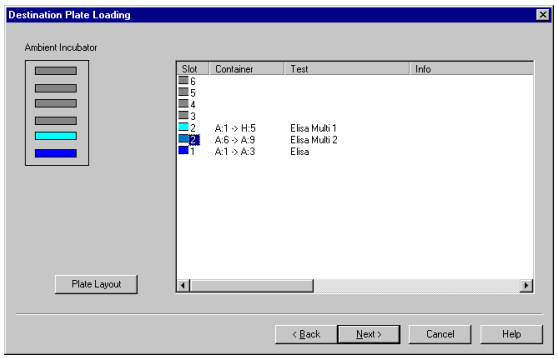
The schedule gives an overview of the pre-calculated start and endtimes of the tests.

- Click 'Next>'.



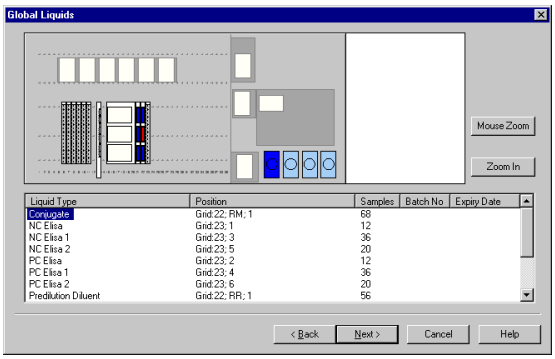
Dialog screen 'Loading of Testkits and Disposable Racks' appears.

- Place all testkit racks (destination racks, predilution racks, transportable reagent racks) on the worktable as indicated on the screen.
- Click 'Next>'



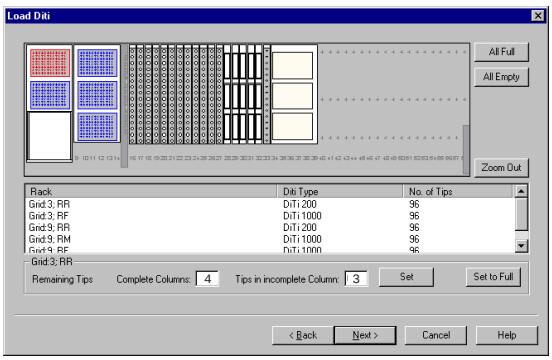
Dialog screen 'Destination Plate Loading' appears.

- Load the destination plates as indicated on the screen.
- To view plate layout select the plate to be viewed by clicking on it and click 'Plate Layout'.
- Click 'Next>'



Dialog screen 'Global Liquids' appears.

- Place the global liquids in the containers as indicated on the screen.
- Click 'Next>'

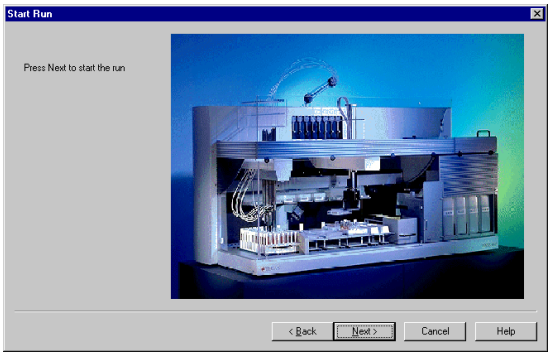


Dialog screen 'Load DiTi' appears (only if a profile was chosen that uses DiTi's).

- Select the DiTi rack to be defined by clicking on it.
- Type in the number of 'Complete Columns' and the number of 'Tips in incomplete Column'.
- Click 'Set'.
- If the selected DiTi rack is full: click 'Set to Full'.

'All Full' : All DiTi racks will be set to full.

Disposable Tips are always picked from left to right and from rear to front. Make sure that partly used DiTi racks are filled up in this direction.



Dialog screen 'Start Run' appears.

- Click 'Next>'

The run is started. See paragraph 6.2.4.

6.2.3.5 Setting up a Run: Unidentified Barcodes

The PosID may fail to identify sample barcodes due to:

1 No barcode label on tube/rack or missing tube/rack.

2 Barcode label placed incorrectly (see figures 6-1, 6-2 and 6-3).

3 Tube placed incorrectly (see figure 6-4).

4 Unreadable barcode label (wrong barcode, damaged label, etc.).

If the PosID failed to read sample barcodes do the following:

1 Make sure that all barcode labels were placed correctly and are undamaged.

2 Make sure that all tubes and racks were placed on the worktable correctly.

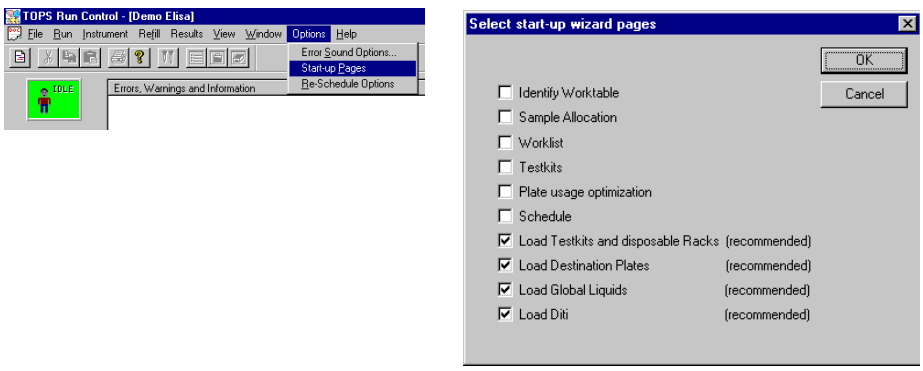
3 Reread the barcode labels.

If the PosID still fails to read the sample barcodes manually enter the sample ID into the TOPS software, or continue with 'Next'. In the second case, TOPS will use the rack and sample position as sample barcode.

6.2.3.6 Setting up a Run: Options

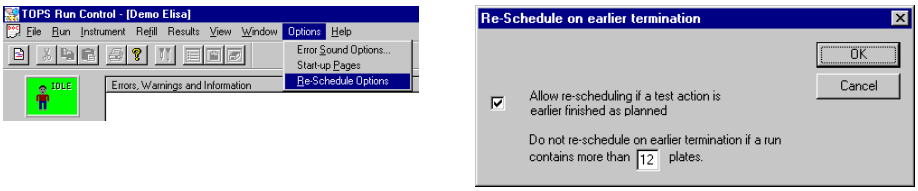
To speed up the start-up procedure of the TOPS run module, some of the dialogs may not need to show up in each start procedure. The dialogs may be skipped by unchecking the boxes of these dialogs (see figure 6-6).

Figure 6-6 Options: Select Start Up Wizard Pages



If a test action finishes earlier than planned, the TOPS run module can recalculate the time schedule so that the run finishes earlier (see figure 6-7). This option is only recommendable if less than 12 plates are processed. With more than 12 plates, the time needed to re-calculate the schedule becomes too long.

Figure 6-7 Options: Re-Schedule on Earlier Termination


TOPS Run Control - [Demo Elisa]
File Run Instrument Refill Results View Window Options Help
Error Sound Options...
Start-up Pages
Re-Schedule Options
IDLE
Errors, Warnings and Information
Re-Schedule on earlier termination
OK
Cancel
Allow re-scheduling if a test action is earlier finished as planned
Do not re-schedule on earlier termination if a run contains more than 12 plates.

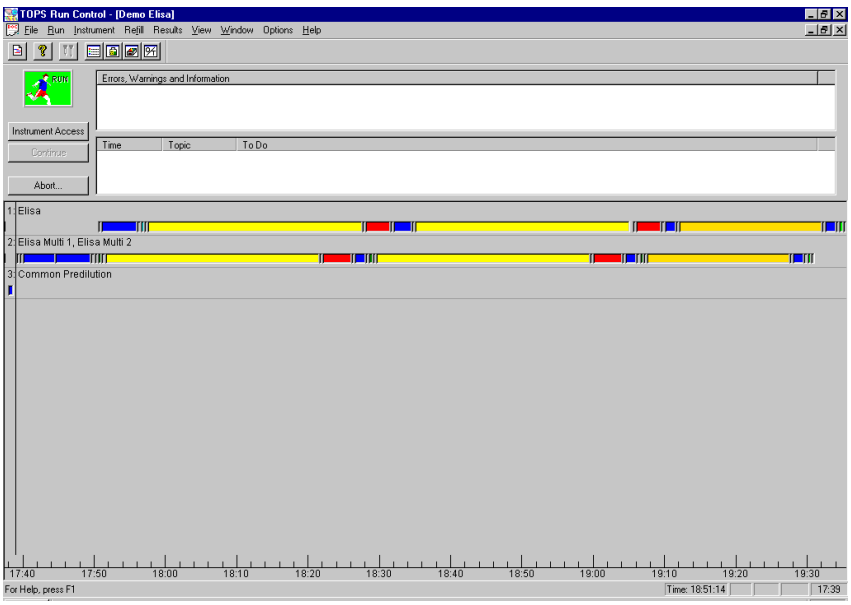
6.2.4 Running a Profile

6.2.4.1 Running a Profile: Introduction

When a profile is running, the TOPS Run Control shows an overview of the status of the run (figure 6-8). In the following situations manual interactions may be necessary during a run:

- The running profile contains To Do steps (see paragraph 6.2.4.2).
- Not enough DiTi's were placed onto the worktable (see paragraph 6.2.4.3).
- Manually pipetting of common pre-dilution required (see paragraph 6.2.4.4).
- An error occurred during the run (see paragraph 6.2.4.5).

Figure 6-8 TOPS Run Control: Run Status



6.2.4.2 Running a Profile: Handling To Do Steps

If a profile includes To Do steps, these steps are listed in the Run Control status screen (figure 6-8). An audio signal indicates that a To Do step must be performed.

Warning:

The current Test / Profile will not continue until a To Do step is handled. If the operator does not handle the To Do step immediately, the results will not be reliable.

Handle To Do steps immediately.

To Do steps may be:

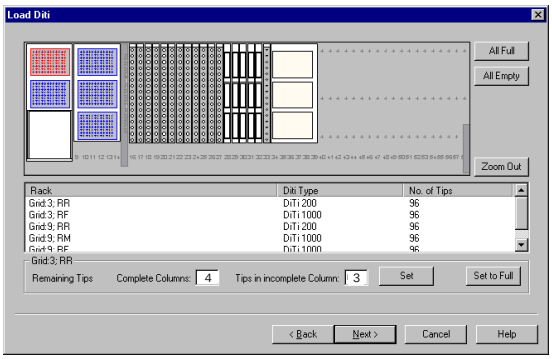
- Load global liquid
- Load plate
- Any other manual interaction defined in the profile

To handle To Do steps:

- Click 'Instrument Access' and wait until the status changes to 'UNLOCKED'.
- Follow the instructions given on the screen and click 'OK'.
- Click 'Continue'. The run continues.

6.2.4.3 Running a Profile: Refilling DiTi's

To refill DiTi's, proceed as follows:



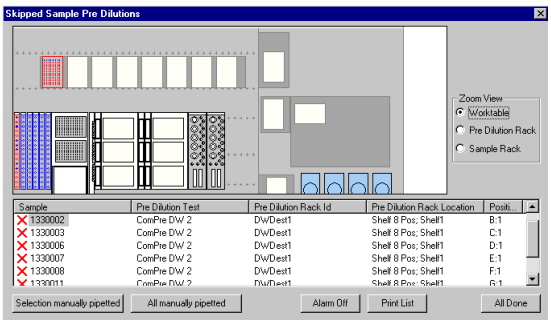
- Click 'Instrument Access' and wait until the status changes to 'UNLOCKED'.
- Select the DiTi rack to be refilled by clicking on it.
- Type in the number of 'Complete Columns' and the number of 'Tips in incomplete Column'.
- Click 'Set'.
- If the selected DiTi rack is full: click 'Set to Full'.
- Click 'Continue'. The run continues.

'All Full' : All DiTi racks will be set to full.

Disposable Tips are always picked from left to right and from rear to front. Make sure that partly used DiTi racks are filled up in this direction.

6.2.4.4 Running a Profile: Manually Pipetting of Common Pre-Dilution

If (an) error(s) occurs during the pipetting of a common pre-dilution (e.g. because not enough liquid was available in the sample tube), an alarm goes off after the pipetting procedure has been finished. Proceed as follows:



- Click 'Instrument Access' and wait until the status changes to 'UNLOCKED'.
- Manually pipet the missing samples into the predilution rack.
- Select the sample that were manually pipetted and click 'Selection manually pipetted' or, if all samples were manually pipetted, click ' All manually pipetted'.
- Click 'All Done'.
- Click 'Continue'. The run continues.

6.2.4.5 Running a Profile: Handling Errors

Errors occurring during a run are listed in the Run Control status screen (figure 6-8). An audio signal indicates that an error occurred. Three types of error messages may occur:

Error. Requires access to the instrument by the user.
Error cause shall be restored before run can be continued.

Warning. Informs the user about a failure which may soon occur.
This message has no influence on the run.

Information to the user. No influence on the run.

To handle the error:

- Double click on the error message in the Run Control status screen (figure 6-8) to get more information about the error.
- Handle the error and click continue (see figure 6-8).

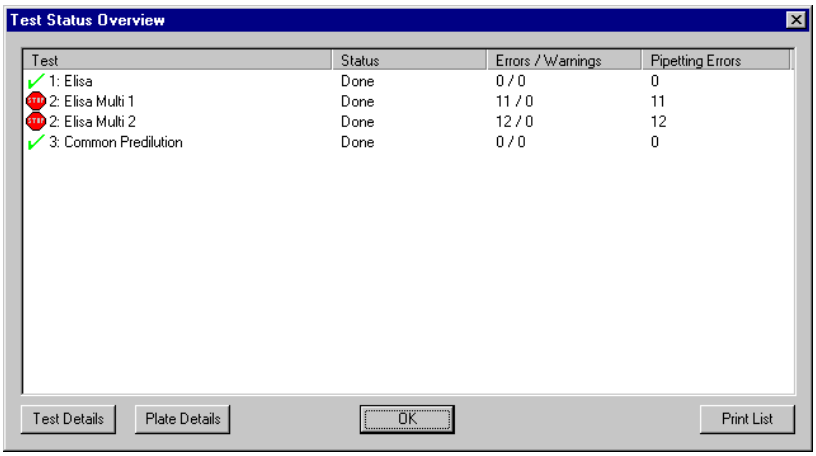
6.2.5 End of Run

6.2.5.1 End of Run: Introduction

At the end of a run, the TOPS Run Control gives a test status overview (figure 6-9). TOPS produces the following test results:

- Test error report (see paragraph 6.2.5.2).
- Pipetting status report (see paragraph 6.2.5.3).
- Test result files (see paragraph 6.2.5.4).

Figure 6-9 Test Status Overview



6.2.5.2 End of Run: Test Error Report

A test error report lists all actions of a test and gives an overview of errors that occurred during the processing of the test. To view the test error report:

- Select a test in the test status overview (figure 6-9).
- Click 'Test Details'.

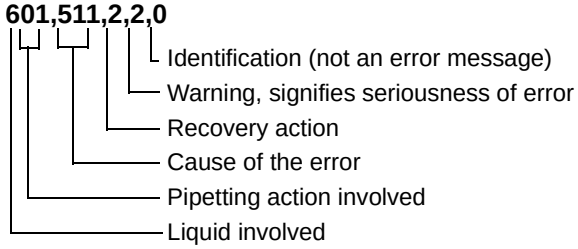
6.2.5.3 End of Run: Pipetting Status Report

A pipetting status report lists all positions with the liquid name and the pipetting status. To view the pipetting status report:

- In the test status overview (figure 6-9) select a test.
- Click 'Plate Details'.

The pipetting status consist of 6 code numbers that define the error that occurred:

Pipetting Status = 601,511,2,2,0

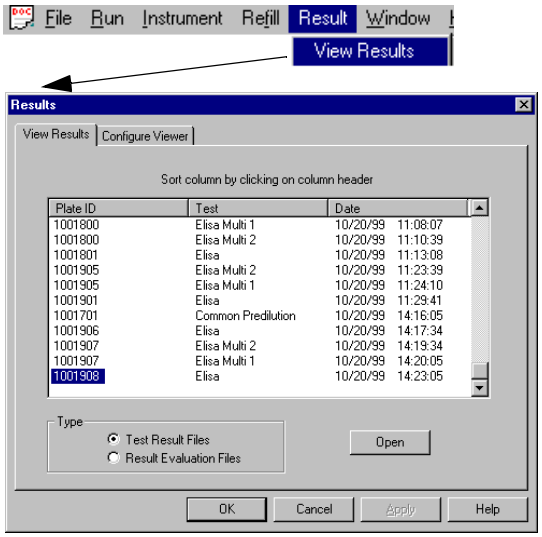


If no pipetting error occurred, the pipetting status is: 0,0,0,0,0.

An overview of all codes and their meaning is given in appendix B.

6.2.5.4 End of Run: Test Result Files

The result files created by TOPS can be read during a test or after a run. To read the result files created by TOPS proceed as follows:

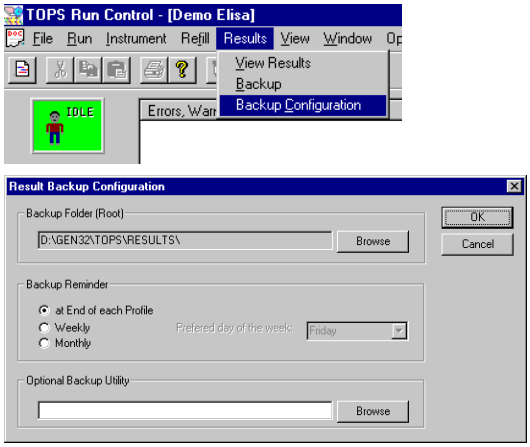


Open a file by double clicking on it.

For an explanation on the pipetting status: refer to paragraph 6.2.5.3 and appendix B.

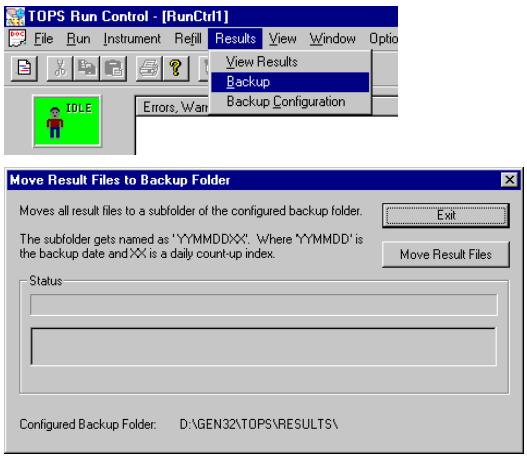
6.2.6 Creating Backup folders

TOPS automatically prompts the user to make backup folders at the end of a run. The frequency in which this occurs can be set as follows:



To set the backup configuration:

- Choose the path where backup folders are to be stored
- Set the backup reminder


TOPS Run Control - [RunCtrl1]
File Run Instrument Refill Results View Window
View Results
Backup
Backup Configuration
IDLE
Move Result Files to Backup Folder
Moves all result files to a subfolder of the configured backup folder.
Exit
The subfolder gets named as 'YYMMDDXX'. Where 'YYMMDD' is the backup date and XX is a daily count-up index.
Move Result Files
Status
Configured Backup Folder: D:\GEN32\TOPS\RESULTS\

To move all result files to a backup folder:

- Click 'Move Result Files
- If 'Exit' is clicked, the files are not moved

The 'Move Result Files to Backup Folder' dialog periodically appears after a run as set in the backup configuration (see above).

6.2.7 Switching off

The *GENESIS* RMP is switched off via the main power switch (see figure 1-1).

6.3 Malfunction - Troubleshooting

6.3.1 Basic Instrument

Symptom	Possible Cause	To Do
TOPS does not connect to instrument	Instrument switched off	Switch on the instrument
	Instrument not connected	Check cable connections
	TOPS runs in simulation mode	Open RspDrv - Log1. Under 'Options' - 'Driver' untick the box 'Simulation'
	Other	Check LED indicators* and call authorized Tecan service technician

*LED indicators:

Two LED indicators, on top of the instrument CU board (open the left service access door), indicate the state of the system. If the green LED is blinking, the status is OK. Otherwise a fatal hardware problem occurred.

6.3.2 Liquid System

Symptom	Possible Cause	To Do
Droplets hanging on fixed tips or DiTi cones	Liquid system leaky	Follow the instructions given in § 7.3.1.1
Droplets coming out of syringes	Liquid system leaky	Follow the instructions given in § 7.3.1.1
Airbubbles in liquid system tubing	Gas evolution	Flush liquid system (see § 7.3.1.2)
	Liquid system leaky	Follow the instructions given in § 7.3.1.1
	System liquid bottle empty	Refill system liquid
Wash station overflow	Waste container full	Empty waste container
	Waste tubing blocked	Unblock waste tubing
No (not enough) liquid detected	Not enough liquid	Add liquid
	Bad ground connection of rack / carrier	Make sure that the worktable is dry
		Place rack correctly on carrier
	Bad connection of ILID cable to board	Call authorized Tecan service technician
No system liquid detected	System liquid bottle empty	Refill system liquid
No DiTi available	Not enough DiTi's in DiTi rack	Place DiTi's at specified position
DiTi not fetched	Wrong tip position coordinates	Call authorized Tecan service technician
	Tip check switch not working	Call authorized Tecan service technician
DiTi not removed	Wet or unclean cone	Clean DiTi cone with ethanol (70%)
	DiTi adapter incorrectly mounted	Call authorized Tecan service technician
	Tip check switch not working	Call authorized Tecan service technician
Initialization error LiHa	X, Y or Z-drive blocked	Clean, check for obstacles (see § 7.3.5.1)
Uneven movements LiHa	X, Y or Z-drive blocked	Clean, check for obstacles (see § 7.3.5.1)

6.3.3 RoMa

Symptom	Possible Cause	To Do
Plate not fetched	No plate on carrier	Place plate on carrier
	Gripper lost plate	Call authorized Tecan service technician
Initialization error	RoMa too far on one side	Place RoMa in the middle of the instrument and re-initialize
	Gripper completely opened / closed	Call authorized Tecan service technician
Collision error detected	Collision	Call authorized Tecan service technician
	Motor blocked	Call authorized Tecan service technician

6.3.4 PosID

Symptom	Possible Cause	To Do
Barcode not read	Barcode not facing reader	Place tubes, racks and carriers with the barcode in the right direction (see also § 6.3.4)
	Bad barcode quality	Replace barcode with new barcode
	Barcode not positioned properly	Place barcode properly (see § 6.3.4)
	Barcode not identified	Make sure that the barcode is positioned properly
		Call authorized Tecan service technician
	Barcode not defined	Call authorized Tecan service technician
PosID initialization error	X, Y or Z-drive blocked	Clean, check for obstacles

6.3.5 Heated / Shaking Incubator

If the shaker unit does not work or fails to initialize, call an authorized Tecan service technician.

If the slot doors keep open or a temperature overload occurs, call an authorized Tecan service technician.

6.3.6 Room Temperature Incubator

If the loading port door is not closing properly, the magnet may be too far to the back. Turn the screw to correct.

If the slot doors keep open, call an authorized Tecan service technician.

6.3.7 Washer

Symptom	Possible Cause	To Do
Plate not washed regularly	Clogging of nozzles	Clean (see § 7.3.3.2)
Fill verification during prime	Clogging of nozzles	Clean (see § 7.3.3.2)
	Conductivity of wash liquid too low	Change wash liquid
Fill verification during wash	Clogging of nozzles	Clean (see § 7.3.3.2)
	Conductivity of wash liquid too low	Change wash liquid (conductance must be between 5 mS/cm and 30 mS/cm
	Droplets on manifold due to splashing	Clean and dry manifold. If using round bottom microplates, reduce dispense speed and / or adjust dispense position (call authorized Tecan service technician)
	Overflow position of aspiration needles too high	Call authorized Tecan service technician
Wash liquid on plate support	Manifold leakage	Call authorized Tecan service technician

6.3.8 Reader

Symptom	Possible Cause	To Do
Lamp low	The optical system is receiving not enough light	Check lamp. If the lamp is working and positioned correctly, call authorized Tecan service technician
No measurement filter defined	Measurement filter was not defined	Define filter
No reference filter defined	Reference filter was not defined	Define filter
Wavelength ... nm not available	The defined reference or measurement filter is not available on the inserted carriage	Change filter carriage or check filter values for incorrect input

7 Maintenance

7.1 Introduction

7.1.1 Safety Instructions

Carefully read the safety instructions in chapter 2 before performing any maintenance procedures.

7.1.2 Personnel Qualifications

Maintenance procedures as described in this manual are to be performed by the operator (for operator qualifications see paragraph 6.1.2), unless mentioned otherwise.

7.2 Schedule

7.2.1 General Directions

The daily and routine maintenance schedule presented here are general guidelines. The schedule may need to be adapted for special conditions of your laboratory. We strongly recommend to prepare a maintenance checklist in your mother language.

7.2.2 Daily Maintenance

⇒

- Wipe up all spills immediately
- Do not allow the pumps to run dry

Item	Action	When?	How?
Liquid system	Check for leaks	Before switching on	§ 7.3.1.1
Syringes	Tighten syringe and plunger lock screw.	Before switching on	§ 7.3.2.1
Fixed tips	Clean	Before switching on	§ 7.3.6.1
	Check for damaging	Before switching on	§ 7.3.6.2
	Tighten tip nut	Before switching on	§ 7.3.6.3
DiTi-Cones	Clean	Before switching on	§ 7.3.6.6
	Tighten	Before switching on	§ 7.3.6.7
Liquid system	Flush	Before each run	§ 7.3.1.2
Washer	Rinse day	At the beginning of each day or when changing wash liquids	§ 7.3.3.1
	Rinse all channels	At the end of each day	§ 7.3.3.1
Waste container	Empty and clean	At the end of each day or when necessary	§ 7.3.4.1

7.2.3 Routine Maintenance

Item	Action	When?	How?
Liquid system	Clean	Once per week	§ 7.3.1.3
Washer	Rinse all channels with ethanol (70%)	Once per month	§ 7.3.3.1
	Unclog nozzles	Once per week	§ 7.3.3.2
System liquid container	Clean	Once per week	§ 7.3.4.1
Wash bottles	Clean	Once per week	§ 7.3.4.1
Reagent troughs	Clean	Once per week	§ 7.3.4.1
Fixed tips	Replace	If damaged or bent	§ 7.3.6.3
RoMa/LiHa	Clean arm guide	Every 6 months or if necessary	§ 7.3.5.1

7.2.4 Half Yearly and Yearly Maintenance

Half yearly and yearly maintenance is to be performed by an authorized TECAN service technician. For a list of maintenance tasks to be performed, please refer to the GENESIS Service and Maintenance Logbook (Doc. ID 390 925).

Before a TECAN service technician carries out any maintenance work, contaminated instruments or instrument parts must be decontaminated according to standard laboratory regulations, and the Decontamination Form attached to this manual must be filled in.

7.3 Procedures

7.3.1 Liquid System

7.3.1.1 Checking the Liquid System for Leaks

The liquid system is leaking if liquid droplets are hanging on the fixed tips or DiTi cones before the GENESIS RMP is switched on. If the system is leaky, do the following:

1 Tighten tip nut (see paragraph 7.3.6.3) or DiTi cones (see paragraph 7.3.6.7).
2 Tighten syringe and plunger lock screw (see paragraph 7.3.2.1).
3 Tighten tubing connections (figure 7-1).
4 Flush the liquid system (see paragraph 7.3.1.2) and observe the tips or DiTi cones for 1 minute. If no droplets are formed, the liquid system is tight.
5 If the system is still leaky: call an authorized Tecan service technician.

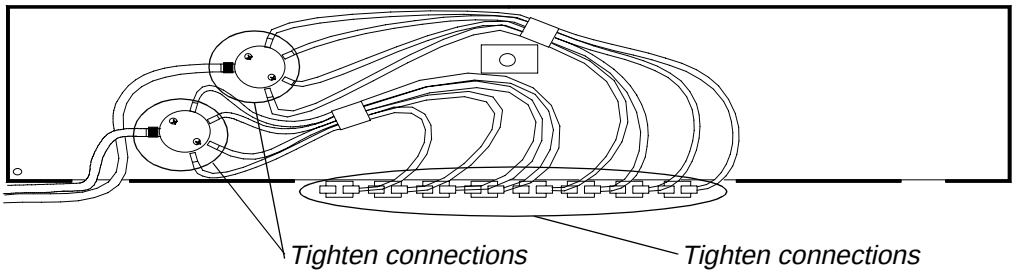
Warning:

A leaky liquid system causes pipetting inaccuracy and cross-contaminations.

Never operate the GENESIS RMP if the liquid system is leaky.

Figure 7-1 Tubing Connections

Top view of instrument



Caution

The RoMa and LiHa are close together when the main cover is closed after tightening the tubing connections. This causes collision when initializing the instrument.

Always separate RoMa and LiHa before initializing the GENESIS RMP.

7.3.1.2 Flushing the Liquid System

When the liquid system is standing overnight, gas evolution results in airbubbles in the liquid system. Also during a run airbubbles remain in the liquid system. Therefore, we recommend to flush the liquid system before each run.

1 Make sur that the System Liquid Bottle is full.
2 Switch on the GENESIS RMP and start TOPS Run Control.
3 In the Run Control main menu select 'Run' followed by 'Create New Run'. Dialog screen 'Select Profile' appears.
4 Select a profile and click 'Next>'. Dialog screen 'Identify Worktable' appears.
5 Prepare the worktable as indicated and click 'Next>'. The hardware is initialized and dialog 'Sample Allocation' appears.
6 In the Run Control main menu select 'Instrument' followed by 'Liquid System'. Dialog screen 'Liquid System' appears.
7 Select the tab [Flush Liquid System] and apply the following settings:
   - Volume: 30000 µl
   - Speed: 495 µl
   - Use MPO
8 Click 'Execute'. The liquid system is flushed.
9 During flushing, carefully observe the tubings. If necessary, gently move the tubings to make sure all airbubbles are removed.
10 If there are still airbubbles in the tubings, repeat steps 4 - 10.

Warning:

Airbubbles in the liquid system cause pipetting inaccuracy.

Never operate the GENESIS RMP with airbubbles in the liquid system.

7.3.1.3 Cleaning the Liquid System

To prevent growth of micro-organisms in the liquid system, we recommend to clean the liquid system once a week. Depending on your application you may soak the system with one of the following agents:

- Weak detergent (2 % solution)
- Weak acid and base in sequence
- 10 % desinfective

To soak the liquid system, proceed as follows:

1 Switch the valve to Maintenance Mode as shown in figure 7-2 and put the tubing into a bottle with cleaning liquid (see above).

2 Flush the liquid system twice as described in paragraph 7.3.1.2.

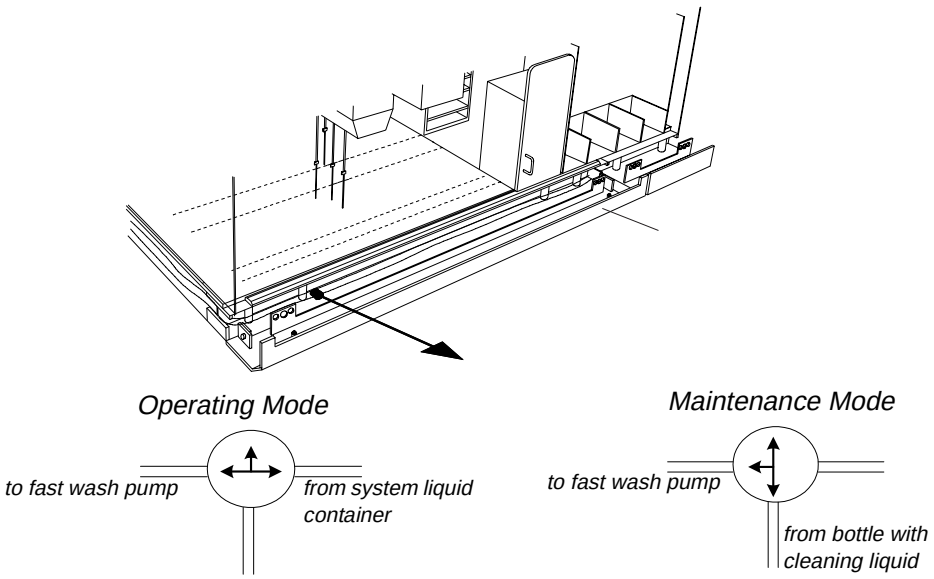
3 Wait for at least 10 minutes to soak the system.

4 Place the tubing in a bottle with distilled or de-ionized water and flush the liquid system two times as described in paragraph 7.3.1.2.

5 Switch the valve back to Operating Mode (see figure 7-2).

6 Flush the liquid system eight times as described in paragraph 7.3.1.2.

Figure 7-2 Clean Liquid System

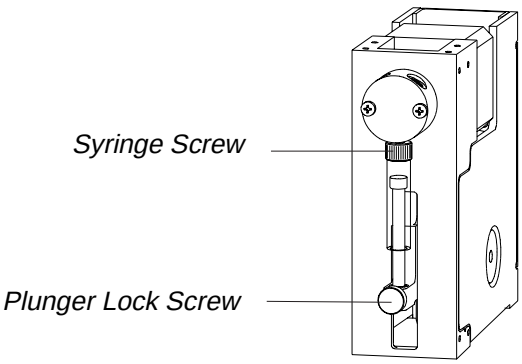


7.3.2 Syringes

7.3.2.1 Tightening the Syringe and Plunger Lock Screws

By the continuous up and down movements of the syringes during operation, the syringe and plunger lock screws may loosen. This causes leakage of the liquid system. Therefore, manually tighten the plunger lock screw and syringe screw (figure 7-3) before switching on the GENESIS RMP.

Figure 7-3 Syringe and Valve



7.3.3 Washer

7.3.3.1 Rinsing the Washer

Rinse Day

At the beginning of each day or when changing washing liquids, rinse the washer with the washing liquid you are going to use or with distilled or de-ionized water.

1 Switch on the GENESIS RMP and start TOPS Run Control.
2 In the Run Control main menu select 'Instrument' followed by 'Washer'.
3 Select the tab [Rinse Day] and apply the following settings:
   - Channel: channel leading to the wash bottle containing the rinsing liquid
   - Duration: 15 sec
4 Click 'Execute'. The washer is rinsed.

Rinse all channels

At the end of each day rinse all channels with distilled or de-ionized water. Once per month, rinse with distilled or de-ionized water followed by ethanol followed by distilled or de-ionized water.

1 Switch on the GENESIS RMP and start TOPS Run Control.
2 In the Run Control main menu select 'Instrument' followed by 'Washer'.
3 Select the tab [Rinse All Channels] and apply the following settings:
   - Duration: 15 sec
4 Connect all channels to the rinse liquid bottle containing water or ethanol.
5 Click 'Execute'. The washer is rinsed.
6 Select the tab [Rinse Night] and apply the following settings:
   - Channel: channel leading to the wash bottle containing water.
   - Duration: 15 sec
7 Click 'Execute'. The washer is rinsed.
8 Switch off the GENESIS RMP.

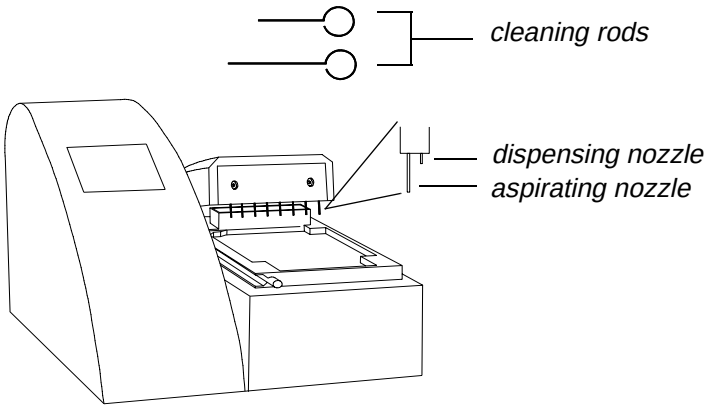
7.3.3.2 Unclogging Nozzles

To unclog the washer nozzles, proceed as follows:

1 Switch off the GENESIS RMP.

2 Clean all nozzles by carefully pushing the cleaning rods into the nozzles. The longer rod is for the aspirating nozzle and the shorter rod is for the dispensing nozzle (see figure 7-4).

Figure 7-4 Washer Nozzles Unclogging



7.3.4 Liquid Containers

7.3.4.1 Cleaning the Liquid Containers

To prevent deposition of cristals and growth of micro-organisms in liquid containers, clean all liquid containers at least once a week. Make sure to allow solvents (e.g. ethanol) to evaporate before filling reagents into the containers again.

Clean the waste containers at least once a day.

7.3.5 RoMa / LiHa

7.3.5.1 Cleaning the Arm Guide

In order to avoid uneven movements of the RoMa or LiHa, clean the arm guide every week or earlier, if required.

1 Switch off the instrument.

2 With a lint free tissue and a screw driver, thoroughly clean the arm guide and the roller of both arms (see figure 7-5).

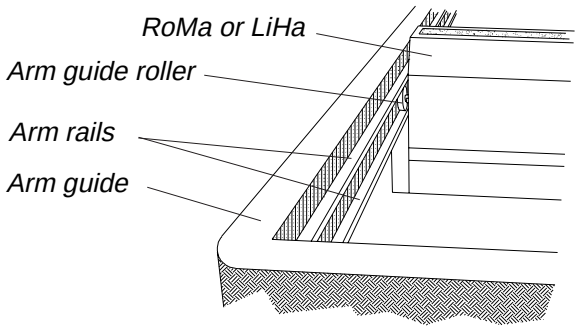
3 Manually move the arms and make sure the movement of both is even.

Caution:

The arm rails and arm guide rollers must be greaseproof for proper function.

Never use grease on the arm rails!

Figure 7-5 Arm Guide and Roller



7.3.6 Fixed Tips

7.3.6.1 Cleaning the Fixed Tips

Before switching on the GENESIS RMP use a lint free tissue soaked in ethanol (70%) or isopropanol to clean the fixed tips. Make sure not to damage the tip coating!

7.3.6.2 Checking Fixed Tips for Damaging

Visually inspect the tip coating before switching on the instrument. Use a mirror to have a proper view on the tip outlet. Make sure that the tips are not bent. If the tip coating is damaged or the tip is bent, the tip must be replaced (see paragraph 7.3.6.3).

Warning:

Bent tips or damaged tip coating cause pipetting inaccuracy and liquid detection errors.

Never work with damaged or bent tips.

7.3.6.3 Replacing Fixed Tips

Fixed tips must be replaced if they are bent or the coating is damaged.To remove fixed tips proceed as follows:

1 Switch off the GENESIS RMP and open the front access door.

2 Unscrew the tip nut (see figure 7-6). Pull the pipetting tubing approximately 10 cm out of the tip adapter and pull tip off the tubing.

To install new fixed tips, proceed as follows (see figure 7-6):

1 Pull down the pipetting tubing until it extends out of the tip adapter by approximately 5 - 10 cm.

2 Cut approximately 0.5 cm off the tubing in an angle.

3 Remove the tube protecting the coated part of the tip. Do not discard the protecting tube.

4 Make sure the tip coating is not damaged.

5 Carefully push the upper part of the tip 6 - 8 mm into the pipetting tubing. Use sandpaper to hold the tubing.

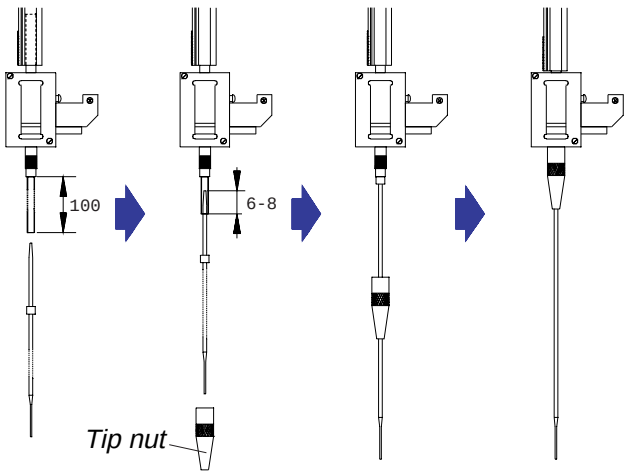
6 Push the tip screw over the coated part of the tip. Make sure not to damage the coating.

7 Manually tighten the tip nut.

8 Set the Z-axis offset using the Instrument Software (see Instrument Software Manual No: 390 791) if the tips differ for more than 0.5 mm in the Z-vector after the instrument is initialized.

9 Flush all tips with 2 M H_2SO_4 (see paragraph 7.3.6.4)

Figure 7-6 Exchange Fixed Tips



7.3.6.4 Flushing new Tips with H_2SO_4

To flush the tips with 2M H_2SO_4 run the Tip Decon Profile supplied with the original database (see also paragraph 6.2.4):

1 Place a 16 positions carrier with 8 13*100 tubes filled with 50MM NaCl solution on grid 10. These vials will be used as samples.
2 Place another 16 positions carrier with 8 empty 13*100 tubes on grid 11. This is the destination carrier.
3 Place the Wash station on grid 13 of the Worktable.
4 Fill a 100ml trough with 2M H_2SO_4 and place it on the rear position of a through Rack on grid 14.
5 Run the Tip Decon Profile (see paragraph 6.1)

7.3.6.5 Disposable Tip (DiTi) Adapter

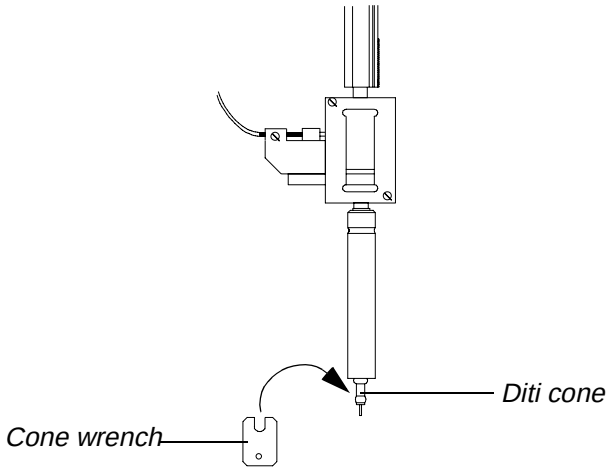
7.3.6.6 Cleaning DiTi Cones

Before switching on the GENESIS RMP use a lint free tissue soaked in ethanol (70%) or isopropanol to clean the DiTi adapters.

7.3.6.7 Tightening DiTi Cones

Tighten the Diti cones with the help of the cone wrench (see figure 7-7).

Figure 7-7 Tightening DiTi Cones



8 Repair

Repairs on the GENESIS RMP instrument, modules or parts thereof shall only be carried out by TECAN authorized service technicians.

TEACN will not accept responsibility for any claim resulting from unauthorized repairs.

Decontamination

In order to protect service and repair personnel, contaminated instruments or instrument parts must be decontaminated according to standard laboratory regulations. Copy and fill in the Decontamination Form and follow the instructions in this form before calling a service technician.

9 Instrument Shut down, Storage

9.1 Instrument shut down

Warning

Depending on the applications run, parts of the unit may have been in contact with biohazardous, poisonous or even radioactive materials.

Thoroughly decontaminate all relevant parts!

If you intend to shut down the instrument for a longer period:

1 Empty the liquid system and thoroughly **clean** and **decontaminate** all liquid system components (see chapter 7).

2 Save data and exit the TOPS software.

Figure 9-1 On / Off Switch

3 Switch off GENESIS RMP.

Wait until the green LED is dark.

Figure 9-2 Electrical Connection

4 Unplug mains socket at rear of instrument from powersupply.

5 Disconnect the PC from the GENESIS RMP.

6 Clean the entire instrument according to the instructions given in chapter 7.

9.1.1 Reporting

1 Fill out a copy of the decontamination form and put it with the instrument.

2 Enter the shut down into your service and maintenance logbook (390 924).

9.2 Storage

Protect the GENESIS RMP against dust and debris with a cover.

Recommendation: store the instrument in its original packaging. Store all manuals and the service and maintenace logbook with the instrument.

Notice the environmental conditions during instrument storage (see paragraph 1.3.5).

10 Packing and Transportation

10.1 Unpacking

The instrument packaging has been carefully designed to prevent damage to the instrument and parts for normal shipping conditions.

Store the original packing materials for possible shipments in case an instrument or module needs repairs at the manufactures site.

Warning

The instrument shall be moved by authorized TECAN service personnel and with the help of the special lifting devices only. Do not attempt to lift the instrument by holding it at arm guides or cover panels!

The GENESIS RMP is a precision instrument. Transporting or moving it by the arm guides or covers might cause the latter to get damaged or even break off. Serious instrument damage or even injuries may result if this instruction is disregarded.

10.2 Packing

The GENESIS RMP shall be packed by TECAN authorized service personnel only. Use original packing material.

10.3 Transportation

All TECAN guarantees are void if the instrument is not correctly packed by TECAN authorized service personnel for shipping. Contact your TECAN representative for assistance.

11 Disposal

TECAN instruments and parts are made of environmentally inert materials which can all be discarded according to normal waste regulations applicable in the specific country.

Warning:

The GENESIS RMP may be contaminated with hazardous materials.

Thoroughly decontaminate the GENESIS RMP before disposal.

12 Accessoires and Spare Parts

Manuals

Part No.	Description
390 840	GENESIS RMP Operating Manual
I 109 004	Operating Manual for Colombus Washer
I 137 701	Operating Manual for Sunrise Reader (Remote Control)
I 139 003	Operating Manual for Spectra and Rainbow Readers
390 837	GENESIS RMP TOPS Software Manual
390 924	GENESIS Service and Maintenance Logbook
390 791	GENESIS Instrument Software Manual

Basic Instrument, RoMa

Part No.	Description
612 003	Transport Handles, 1 Set
612 503	Reference Tip, stainless steel
619 517	Cone Wrench for DiTi option
619 001	Set of guide pins: 15 guide pins, 5 stop pins, 2 reference pins
619 003	Rubber sealing strip for worktable 200 cm
	Gripper finger left
	Gripper finger right

Liquid System, Diluters, Tips

Part No.	Description
619 423	Syringe XP3000 0.25 ml
619 424	Syringe XP3000 0.5 ml
619 425	Syringe XP3000 1.0 ml
619 426	Syringe XP3000 2.5 ml
619 427	Syringe XP3000 5.0 ml
612 501	Standard Tip, steel tip, teflon coated outside, without lock nut
612 504	Ceramic Tip, stainless steel tip, hard ceramic coating inside and outside, without lock nut
619 515	Lock nut for standard and ceramic tip
619 502	Disposable Tip Option for 200 µl and 1000 µl tips
619 508	Set of sealing rings for DiTi options
612 510	Disposable Tips 200 µl, conductive, 2304 pieces
612 511	Disposable Tips 200 µl, conductive, with filter, 2304 pieces
612 512	Disposable Tips 1000 µl, conductive, 2304 pieces
612 513	Disposable Tips 1000 µl, conductive, with filter, 2304 pieces
750 141	Liquid system bottle 10 l
290 338	Waste bottle for system liquid with snap locks

Additional Devices

Part No.	Description
106 001	Colombus Washer Manifold 8 nozzles
106 003	Colombus Washer Manifold 16 nozzles
750 620	Set of 4 wash liquid containers
750 661	Set of 4 aspirating tubings for Colombus washer (outer diameter 5mm) with snap locks
619 401	5 m aspirating tubing PVC for Colombus washer waste (outer diameter 9 mm)
36301	Additional Filterslide for Sunrise Reader without filters
36601	Additional Filterslide for Sectra Reader without filters
30340	Filter 340 nm
30370	Filter 370 nm
30405	Filter 405 nm
30415	Filter 415 nm
30450	Filter 450 nm
30492	Filter 492 nm
30540	Filter 540 nm
30550	Filter 550 nm
30570	Filter 570 nm
30620	Filter 620 nm
30630	Filter 630 nm
30690	Filter 690 nm
30750	Filter 750 nm
750 014	Alarm Device (FLASHING Light Module 24V AC/DC)

Carriers, Racks, Troughs

Part No.	Description
613 001	Wash Station Carrier, 8 Deep and 8 Shallow Positions
619 404	Waste Tubing GENESIS, PVC, 12 x 9 mm, length, 2.5 m
613 012	Carrier for Disposable Tips, 2 DiTi Racks 96 Tips, 1 Waste Position
613 022	Carrier for Disposable Tips, 3 DiTi Racks 96 Tips
613 013	Waste Slide for Disposable Tips (for use with rack 613 012)
613 015	Carrier for Tubes 10 mm, 96 Pos. (not for use with PosID)
613 004	Carrier for Tubes 13 mm, 96 Pos. (not for use with PosID)
613 005	Carrier for Tubes 16 mm, 96 Pos. (not for use with PosID)
613 014	Carrier for Tubes 10 mm, 16 Pos. (set of 6 carriers)
613 002	Carrier for Tubes 13 mm, 16 Pos. (set of 6 carriers)
613 003	Carrier for Tubes 16 mm, 16 Pos. (set of 6 carriers)
613 020	Carrier for 3 Additive Troughs, Tecan 100 ml, 1 c. u. wide
613 011	Custom Carrier Kit, 1 Carrier Bottom, 1 Glider, 8 Screws
613 016	Cooled Reagent Carrier, Cooled Block for Tubes
613 017	Cold pack set, 4 pieces, for 613 016
613 010	Carrier for Reagents, Plastic Block, Undrilled, 3 c.u. wide (for use on worktable only)
613 019	Rack for Reagents, Plastic Block, Undrilled, 127.5 x 85.5 mm (transportable with RoMa)
750 502	Abbott specific carrier for controls and reagents
612 604	Carrier for Microplates RoMa, 3 Pos., Landscape Orientation
612 605	Carrier for Microplates RoMa, 2 Pos., Portrait Orientation
612 609	Set of 3 microplate holder XL (size 128.5 mm x 86.5 mm) (Option for Carriers 612 604 and 612 605)
612 674	Hotel for Microplates, stores 9 MTPs
612 021	Reagent Troughs 100 ml for use in 613 020 (100 pieces)
520 629	Reagent Troughs 20 ml for use in 613 019 (100 pieces)

13 Customer Support

13.1 Customer Support on the Internet

Visit our customer support website at `http://www.tecan-cs.ch/index1.htm`. Here you find technical information about our products and the timeschedule for training courses.

13.2 How to reach us by Telephone

TECAN Schweiz AG and its representatives maintain a fully trained staff of technical specialists around the world. For any technical questions, contact your nearest TECAN representative.

Switzerland	TECAN Schweiz AG Feldbachstrasse 80 CH-8634 Hombrechtikon Switzerland	Telephone Telefax E-Mail Internet	: +41/55 254 82 82 : +41/55 254 82 81 : hotline@tecan.com : http://www.tecan.com
Austria	TECAN Austria Ges.m.b.H. Untersbergstrasse 1a 5082 Grödig / Salzburg	Telephone Telefax E-mail	: +43 624 6 8933 : +43 624 67 2770 : tecan-a@tecan.co.at
France	TECAN FRANCE S.A. Parc d'Activités de Pissaloup Bâtiment B - HERMES II 27, Rue Edouard Branly 78190 Trappes	Telephone Telefax E-Mail	: +33 1 30 68 81 50 : +33 1 30 68 98 13 : 113043.3132@compuserve.com
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Japan	TECAN (Japan) Co. Ltd. Meiji Seimei Fuchu Building 10F 1-40, Miya-machi Fuchu City Tokyo 183	Telephone Telefax E-Mail	: +81 4 2334 8855 : +81 4 2334 0401 : info@tecan.co.jp
USA	TECAN U.S., INC. P.O. Box 13953 Research Triangle Park / NC 27709	Telephone Telefax E-Mail	: +1 919 361 5200 : +1 919 361 5201 : tecan-us@tecan-us.com
Asia	TECAN Asia 26 East Coast Avenue Singapore 459 231 Singapore	Telephone Telefax E-Mail	: +65 444 18 86 : +65 444 18 36 : tecan@tecan.com.sg

A Decontamination Form

TECAN Schweiz AG • Feldbachstrasse 80 • CH-8634 Hombrechtikon • Switzerland

Phone +41-55-254 81 11• FAX +41-55-244 45 83 • http:// www.tecan-group.com • E-mail: tecan@tecan.ch

Decontamination Form

This form must be completed before a service engineer performs any service on the instrument or parts of it (e.g. washer, reader, incubator etc.). If it is returned to the distributor the form must be added to the other shipping documents of the instrument / components.

I hereby declare that any parts in this package have never been exposed to any hazardous biological and / or radioactive material or that such parts have been decontaminated or disinfected to remove or inactivate any biological and / or radioactive material which could be dangerous to service personnel.

The parts have been decontaminated according to the decontamination instructions given in the appropriate instrument manual.

Instrument Type: ..... **Serial No:** .....

Parts which have been decontaminated (tick appropriate box):

❑ Tip / Tip tubing	❑ Worktable	❑ Reader*
❑ Syringes	❑ Incubators*	❑ Washer
❑ Pipetting waste	❑ Washer waste	❑ Wash station
❑ PosID*	❑ Interior surfaces	

* Use only 70% ethanol

Name: .....

Company: .....

Phone: .....

Address: .....

.....

.....

Country: .....

Date of Decontamination: .....

Type of Disinfectant used: .....

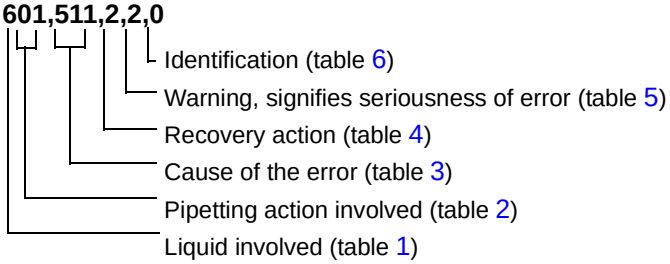
.....

Date: ..... **Signature:** .....

B Pipetting Status

The pipetting status consist of 6 code numbers that define the error that occurred:

Pipetting Status = 601,511,2,2,0


Identification (table 6)
Warning, signifies seriousness of error (table 5)
Recovery action (table 4)
Cause of the error (table 3)
Pipetting action involved (table 2)
Liquid involved (table 1)

If no pipetting error occurred, the pipetting status is: 0,0,0,0,0.

Table 1 Liquid Involved

Error #	Liquid affected	Explanation
0..	No liquid	When the error occured there was no liquid being treated, i.e. liquid was not directly affected.
1..	Sample	Without Predilution: Sample error With Predilution: Predilution (additive) error
2..	Control	Without Predilution: Control error With Predilution: Predilution (additive) error
3..	Additive	Additive was possible treated incorrectly
6..	Source in Predilution Mode	The source liquid of a pre-dilution was possibly affected
7..	Control in Predilution Mode	Control or standard of a pre-dilution was possibly affected
8..	Additive / Predilution	The additive of a pre-dilution was possibly affected
9..	Multiple Cause	Error condition not assigned to a particular liquid

Table 2 Pipetting Action Involved

Error#	Error Name	Meaning the error occurred…
00	Unknown Action	somewhere on software level
01	Aspirate: Move Down	before aspiration, while moving down (no liquid ?)
02	Aspirate only	during aspiration (syringe drive blocked ?)
03	Aspirate: Retract	after aspiration (no exit signal detected)
04	Aspirate: Clot Detec-tion	after aspiration (clot in liquid ?)
05	Aspirate: Move in Z	on the mechanical level (Z-drive obstructed ?)
10	Dispense: Move Down	before dispense, while moving down (no liquid?)
11	Dispense only	during dispense (syringe drive blocked ?)
12	Dispense: Retract	after dispense (no exit signal detected)

Table 2 Pipetting Action Involved

Error#	Error Name	Meaning the error occurred…
13	Dispense: Move in Z	on the mechanical level (Z-drive obstructed ?)
20	Mixing: Move Down	before mixing, while moving down (no liquid ?)
21	Mixing only	during mixing (syringe drive blocked ?)
22	Mixing: Retract	after mixing (no exit signal detected)
23	Mixing: Move in Z	on the mechanical level (Z-drive obstructed ?)
30	Flush	during flushing
31	Wash	during washing
32	Pickup Diluent	while picking up diluent
33	Pickup	while aspirating air etc. (syringe drive blocked ?)
34	Put Down	while dispensing diluent / air etc. (syringe drive blocked ?)
35	Diluter Initialization	while initializing the precision pump (valve / syringe drive blocked ?)
36	Move Arm in X or Y	while moving arm in X or Z (drive blocked ?)
37	Move Tip in Z	while moving the tip up or down (Z-drive blocked ?)
50	Dispense Check Read	during dispense check with reader

Table 3 Errors: Causes

Cause Code#	Meaning :
509	The tip was not able to detect any liquid: container is empty or liquid not detectable with the given settings.
510	Drives are in a ‘no load state’ - after a crash.
511	Not enough liquid for the intended operation in the container
512	Not enough liquid for the intended operation in the container
513	Collision between tip and PosID module avoided: position of PosID unknown. This error should normally be handled by the software.
516	Power fail circuit: a device did not receive power (normally during initialization: not connected correctly ?)
518	Clot limit passed: the tip has moved out and detected an exit signal above the clot limit.
519	While retracting (clot detector on) – no exit signal detected
520	While retracting (clot detector off) – no exit signal detected
524	ILID pulse error: the clot detector registered illegal pulses
525	Tip not fetched: the adapter did not succeed to pick up a disposable tip
526	Tip not mounted: before going into dispense position, the instrument checked and found no disposable tip on the adapter.
527	Before picking up a tip, the instrument checked and found that a disposable tip was already on the adapter (tip not correctly ejected ?)

Table 3 Errors: Causes

Cause Code#	Meaning :
709	Plunger overload: a syringe drive is probably blocked
710	Valve overload: a valve cannot turn to the correct position
711	Plunger move not allowed: the syringe plunger is not allowed to move unless the valve is in intake or output position
800	Dispense Check

Table 4 Errors: Recovery Actions

Recovery Code#	Meaning: After the Error, the instrument…
1	retried the pipetting action
2	skipped the pipetting action
3	moved to Z-bottom
4	aborted the method
5	finished the current pipetting action and then stopped
6	continued with the method with the order to stop when the method is executed
7	ignored the error and attempted to continue as if no error had occurred
9	searched for Disposable Tips
10	retried the Wash cycle
11	disabled the diluter channels
12	went for a new liquid position
20	manually pipetted

Table 5 Errors: Warning

- 0 = Pipetting was not affected and has been executed
- 1 = the error was not critical for the quality of the results
- 2 = a critical error - result is not useable

Table 6 Errors: Identification

- 0 = Identification by PosId or not bar-coded
- 1 = User entered the Identification manually